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MACWORLD

THE MACINTOSH® MAGAZINE

May 1993 \$3.95 Canada \$4.95

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Apple Takes On
Novell

SPECIAL REPORT

Color Printers

27 Models Compared

25 Monitors Tested
Top Values in Monochrome Displays

Plus:

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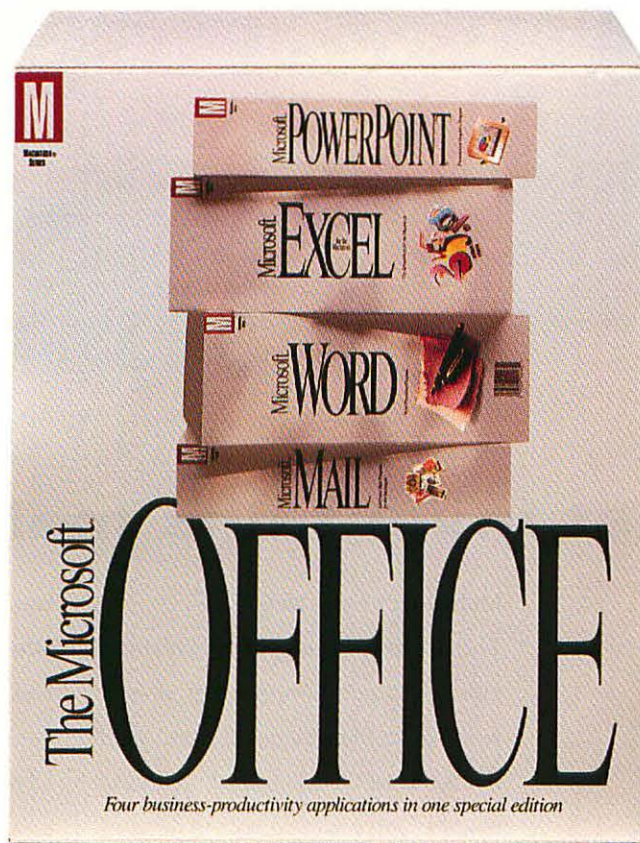
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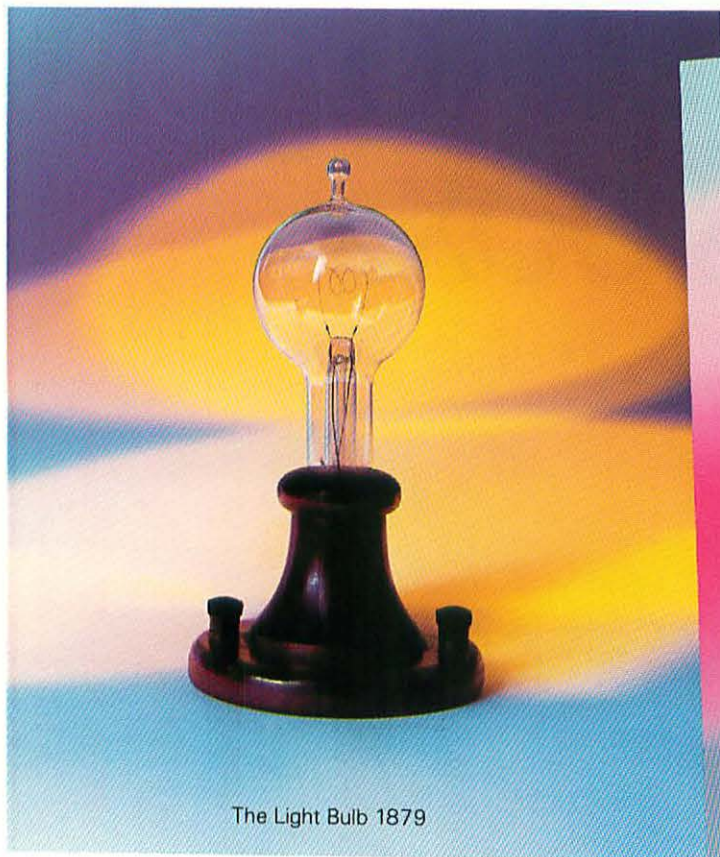
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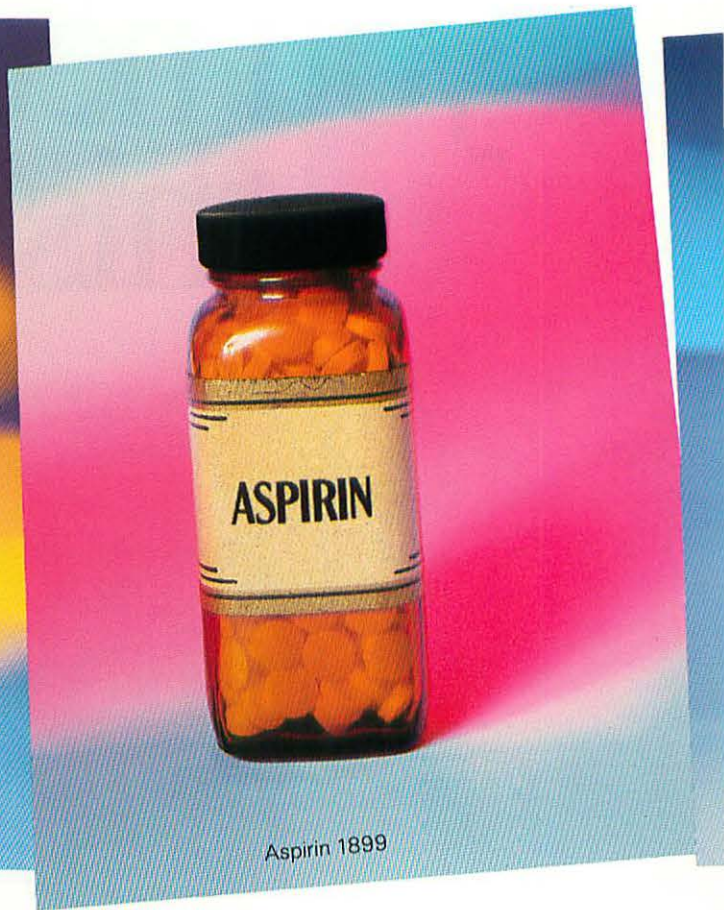
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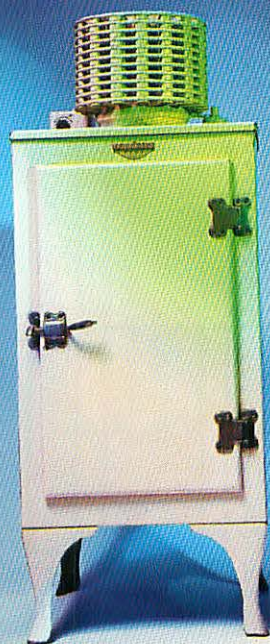
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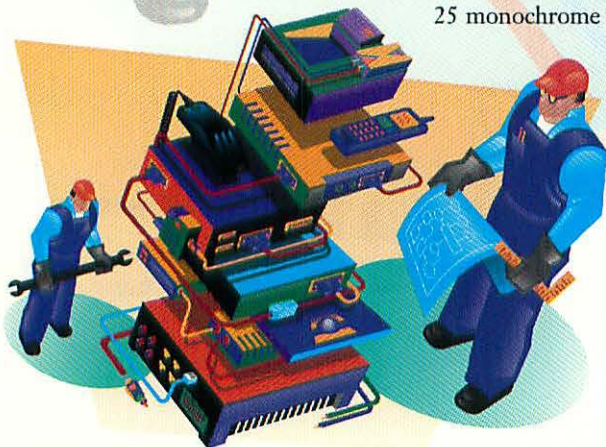


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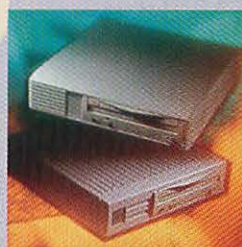
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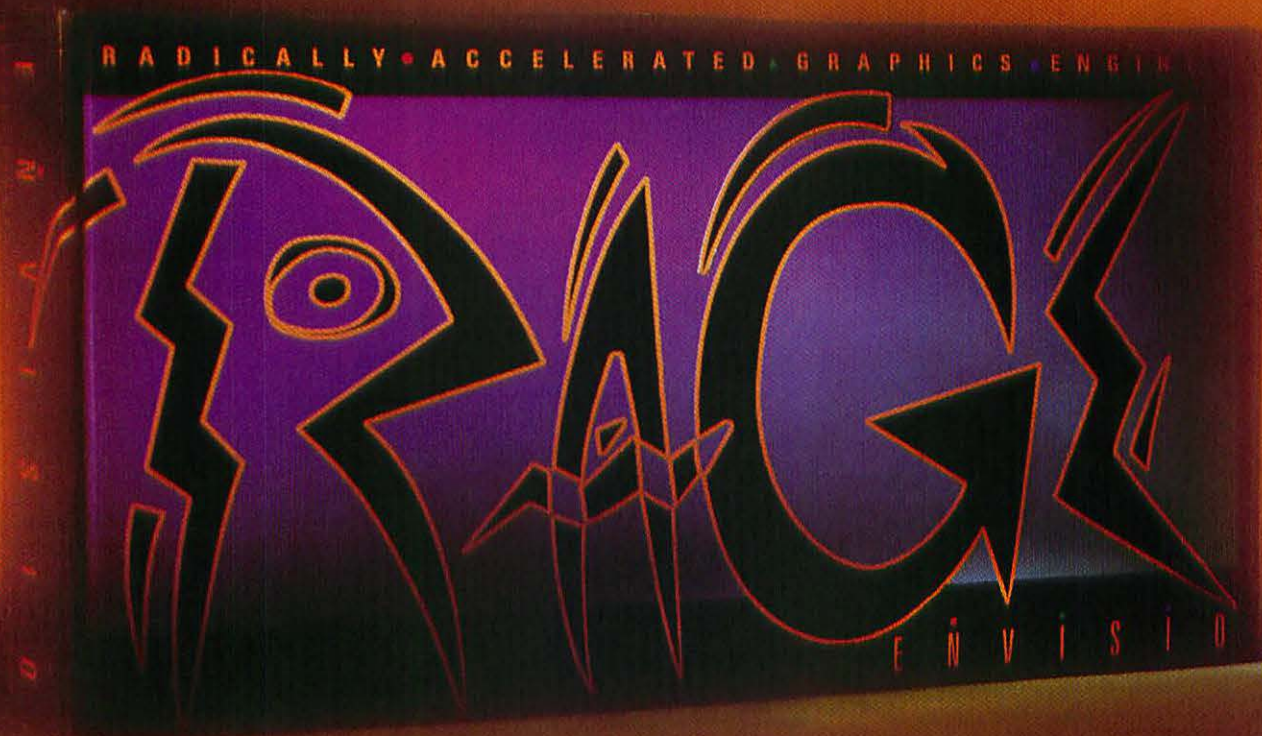
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Thunder/24 box pictured; Thunder II Light was not available.

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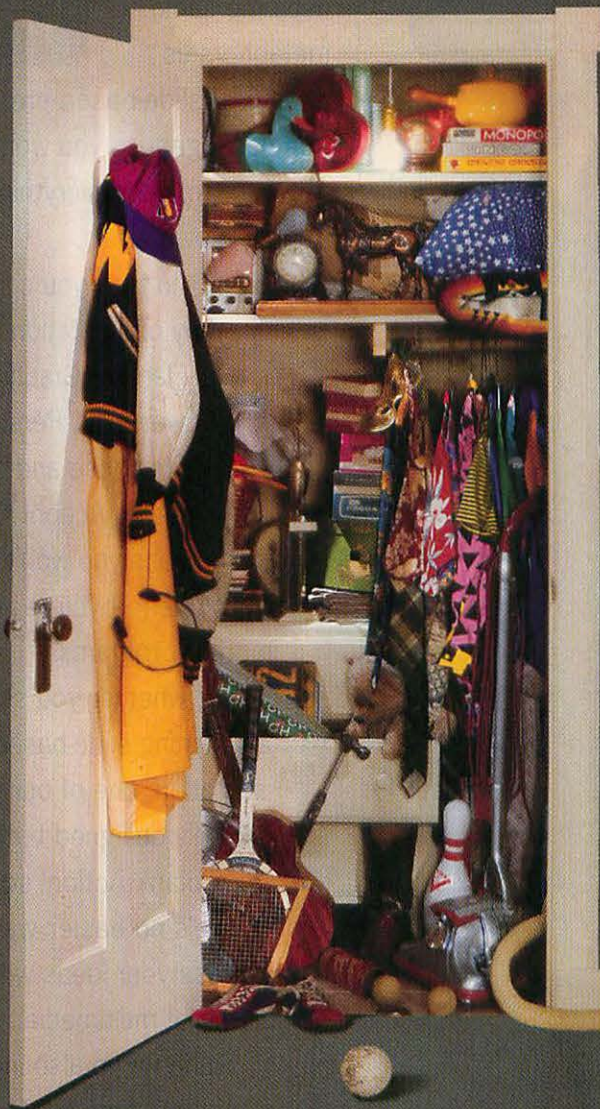
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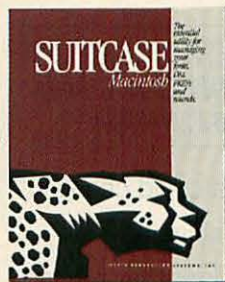
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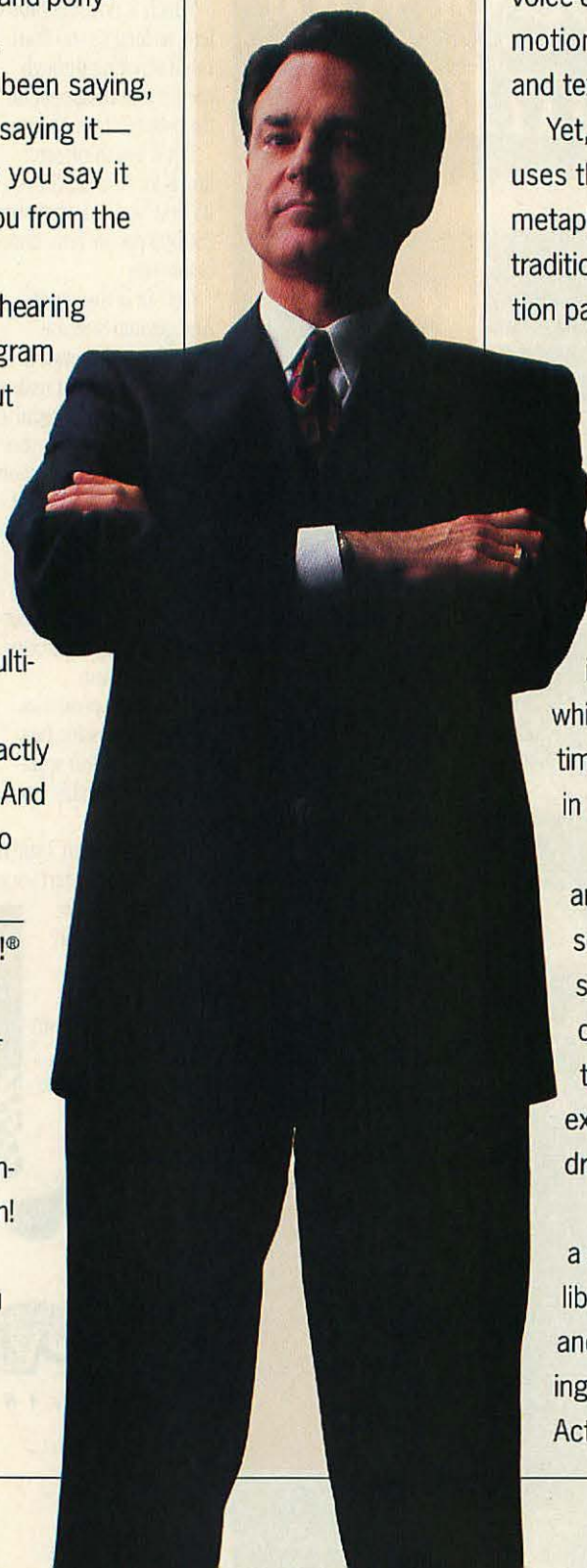
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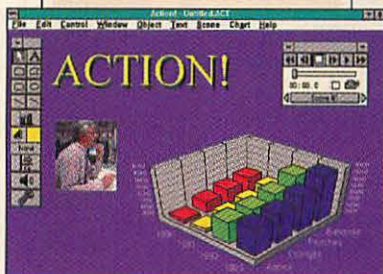
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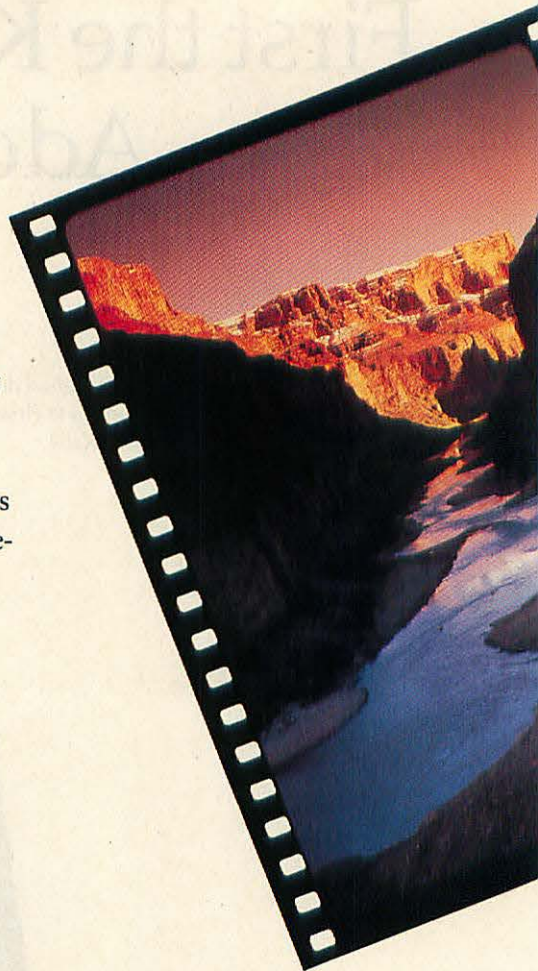
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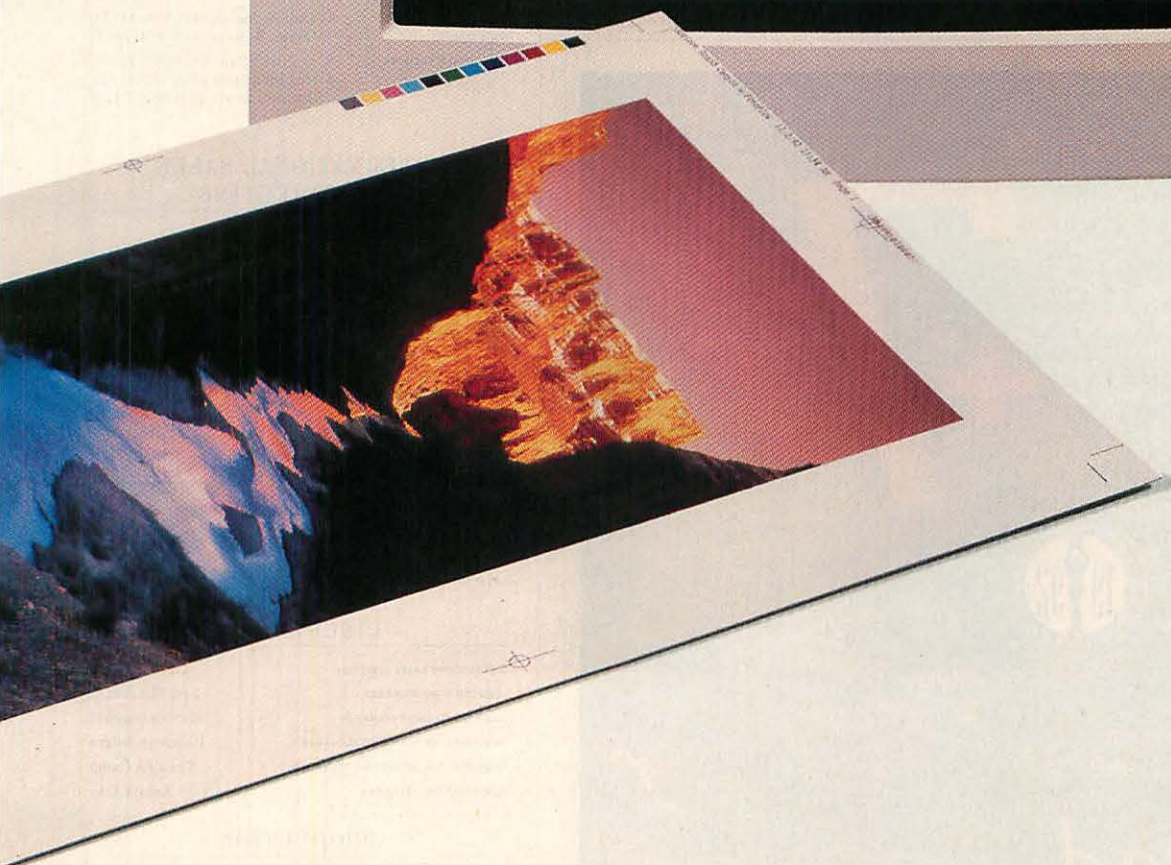
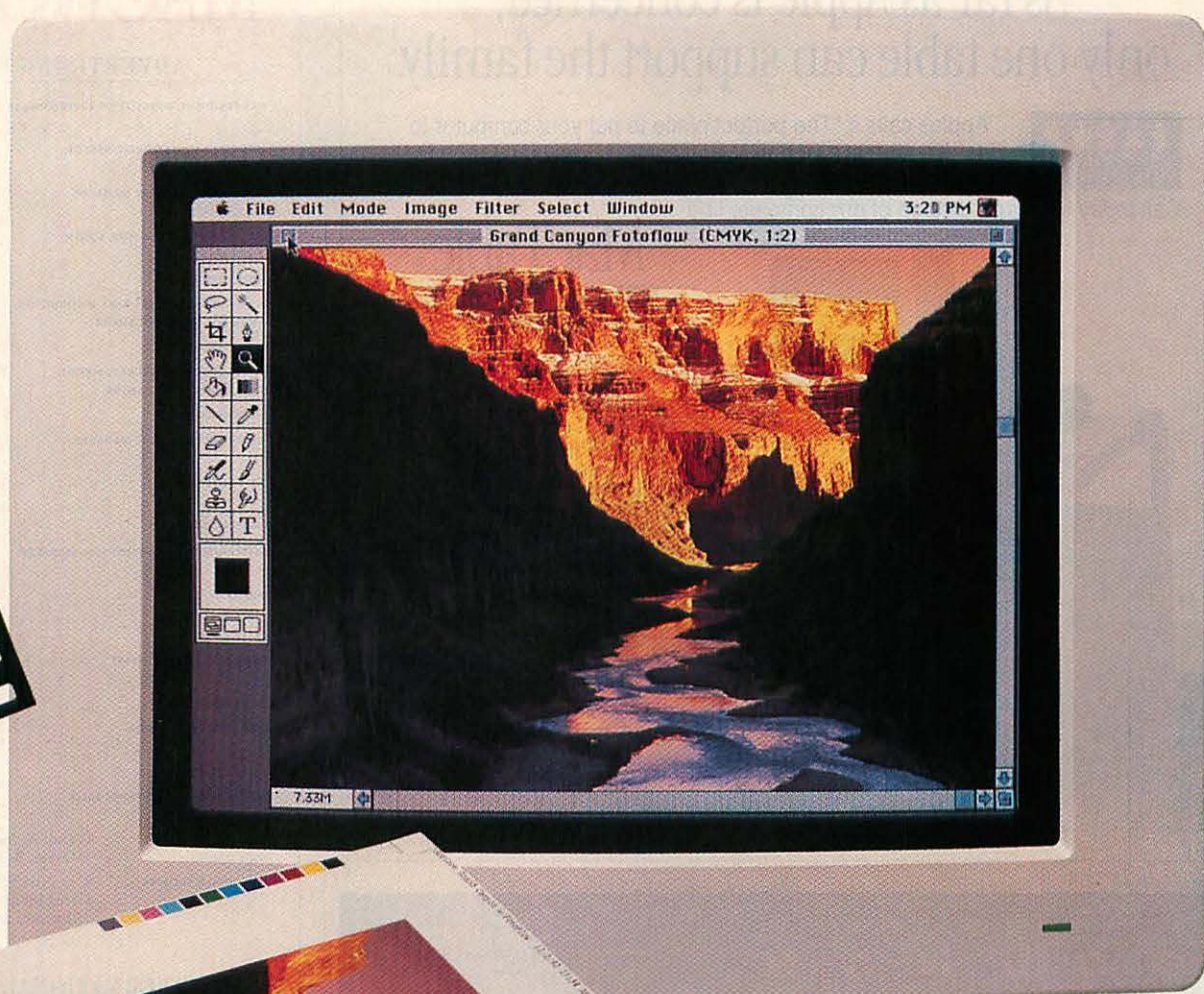
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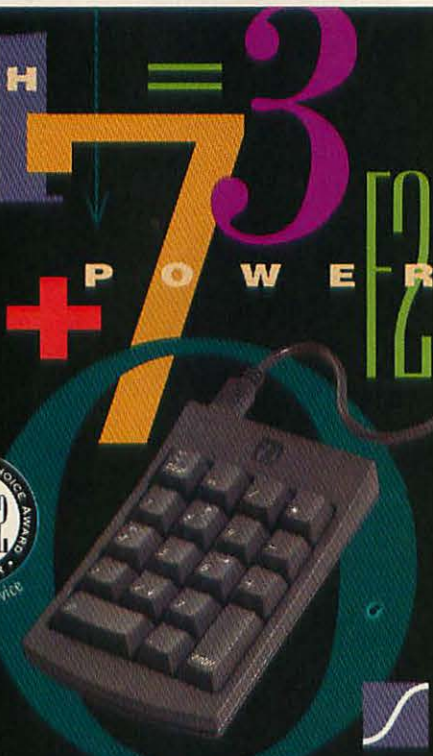
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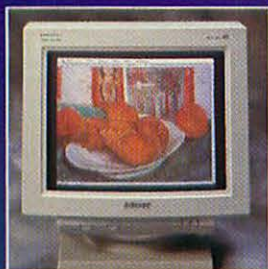
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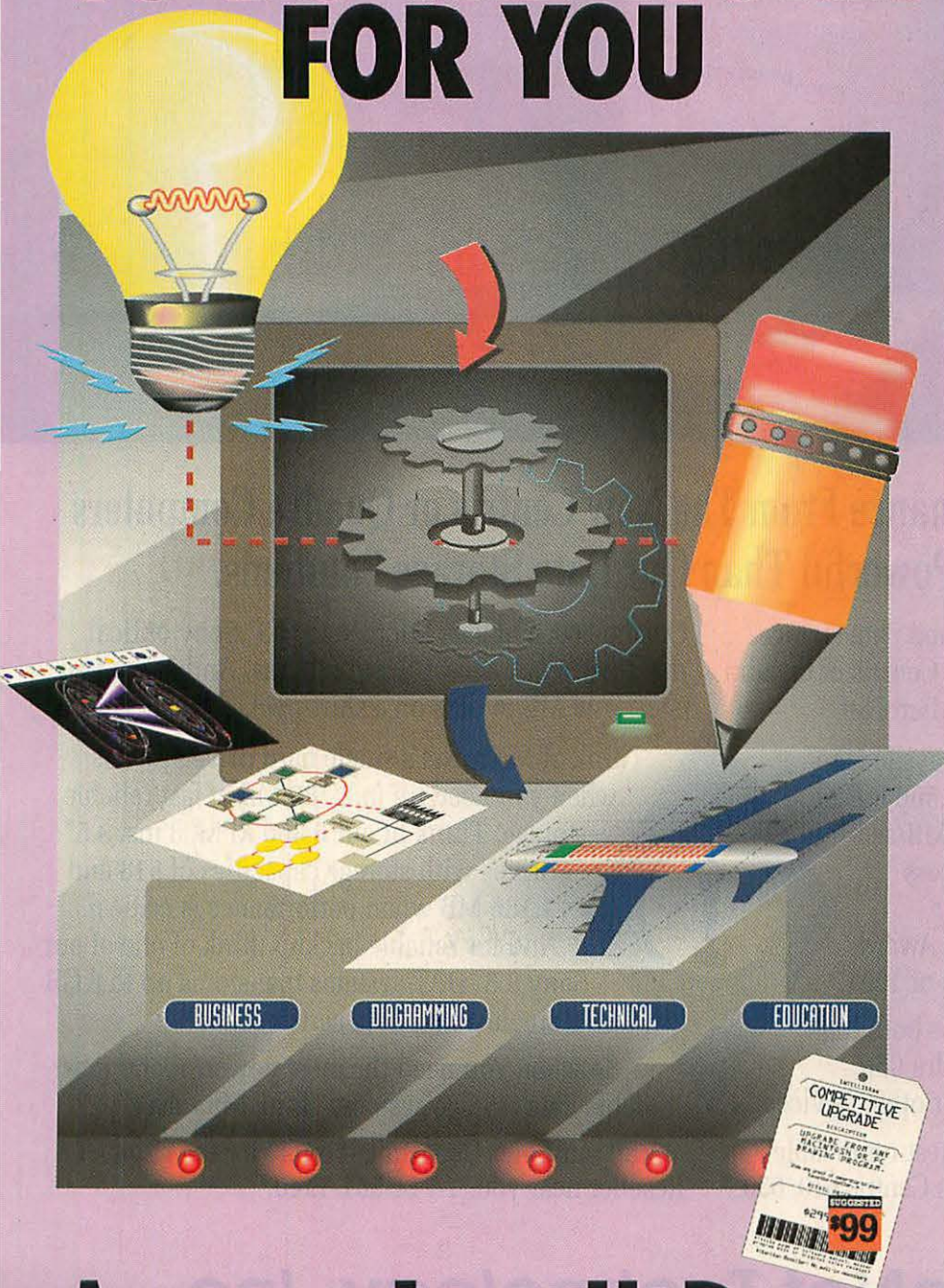
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MacBulletin

L A T E - B R E A K I N G N E W S

SuperMac Buys E-Machines' Line:

SuperMac (408/245-2202) and E-Machines have signed a deal in which SuperMac will take over E-Machines' product line and gain control of the E-Machines brand name. SuperMac says it will service and honor warranties on E-Machines' products. E-Machines has concentrated on midsize, medium-cost monitors, while SuperMac has specialized in high-end monitors. E-Machines plans to regroup as a research and development house.

E-Mailing the White House:

The White House is accepting E-mail addressed to the president at CLINTON PZ on America Online, and at 75300,3115 on CompuServe. White House staff ask that E-mail messages carry a clear description in the Subject field and a street address, since responses are sent by regular mail. America Online has established an area called From the White House (in the News and Finance area under Departments) that includes complete transcripts of the president's speeches, public meetings, and press conferences.

Apple Reclaims HyperCard:

Apple has taken over the software construction kit HyperCard from the company's software subsidiary, Claris. Apple plans to upgrade HyperCard, market it as a developer's tool, and integrate it with AppleScript in some way. Claris (408/727-8227) will support users of HyperCard, now at version 2.1, until Apple ships a new version.

Third-Party Docking Stations:

SuperMac is now shipping two E-Machines-brand docking stations, the PowerLink Presenter and the

PowerLink DeskNet. The \$499 PowerLink Presenter supports 8-bit color on TVs, LCD projectors, SVGA displays, and Mac monitors. It also includes a floppy drive connector, an ADB port, and a sound-output port. The \$699 PowerLink DeskNet incorporates full-speed Ethernet, supports 8-bit color on Mac or SVGA monitors, and has a SCSI port, floppy drive connector, and all the same connectors as a Mac II.

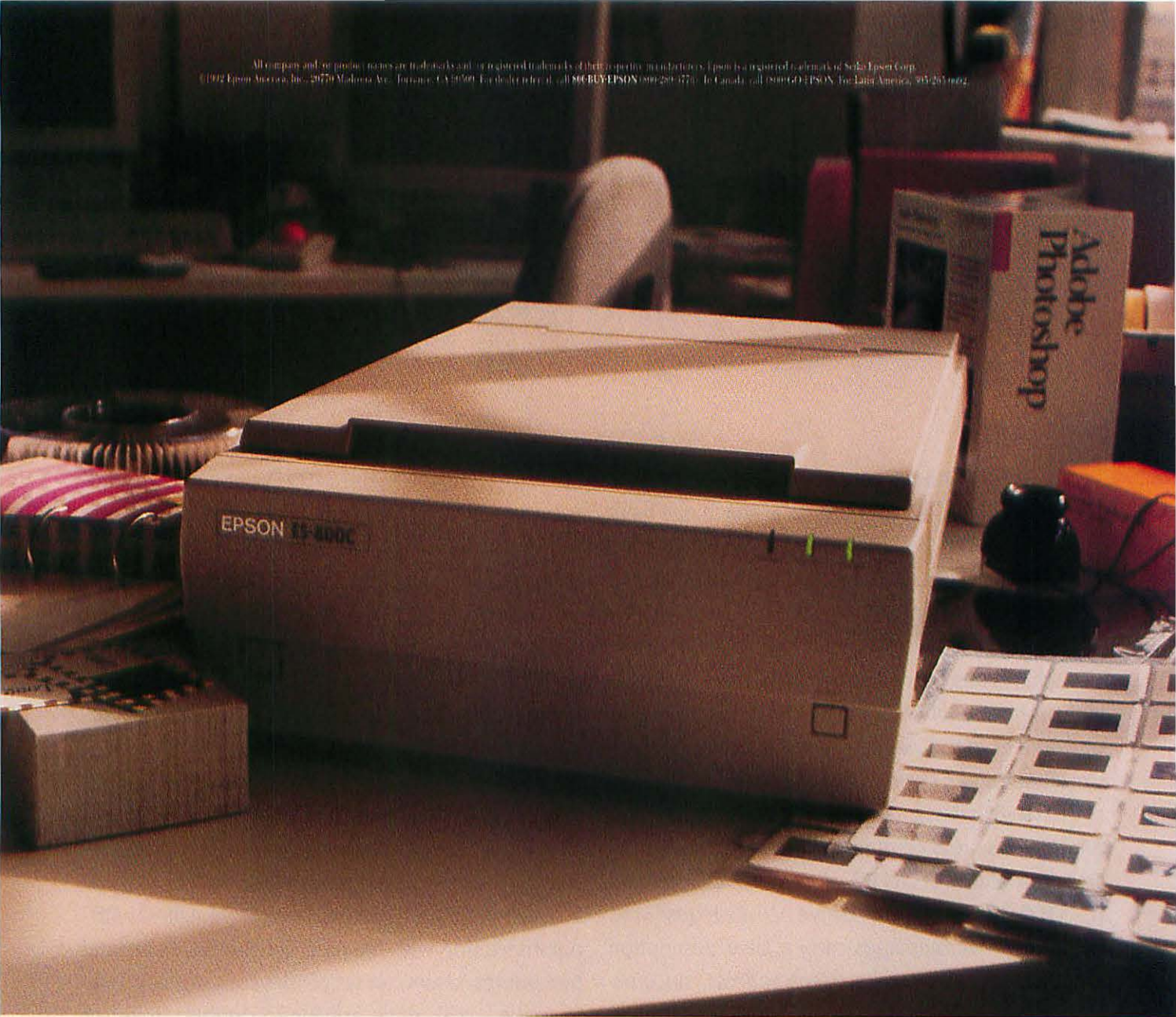
More Disk Compression:

Alysis (415/566-2263) is expanding its compression-utility line with eDisk. The \$149.95 utility resembles Stac Electronics' Stacker: eDisk compresses the contents of an entire disk drive, instead of individual files, without interfering with the Mac file manager's normal procedures. Users can set eDisk's compression level to make a disk drive appear to double, triple, or quadruple in size. Alysis could not say at press time if eDisk would require reformatting a drive at installation.

WordPerfect Acquires Grammatik:

WordPerfect (801/225-5000) acquired Reference Software and its grammar checker, Grammatik, just as Reference was releasing Grammatik version 5 and several new products. WordPerfect says the \$99 Grammatik 5's improved linguistic engine suggests more accurate changes and flags fewer false errors. Version 5 has a 100,000-word spelling checker and can quit checking a document part-way through and later resume where it left off. Other new products from WordPerfect include the Random House Webster's Dictionary and Thesaurus College Edition, also \$99. **m**

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A New Mac Lineup

BY ADRIAN MELLO

HAVE YOU EVER SEEN THAT video where Michael Jackson's face is transformed into several entirely different faces? Then you know what morphing is. Morphing is computer graphics' latest visual trick for intriguing audiences. But a more important kind of morphing has been going on, as well—the morphing of the Mac. In the last six months, Apple has completely revamped the Macintosh product line. The changes are so broad and so rapid, it's as if we were watching the Mac product line change before our very eyes. Apple has changed nearly every product in its line, from the Classic to the Quadra. A whole new midrange lineup replaces the venerable Mac II series. The recent introduction of the color PowerBook 165c, along with the introduction of the Duo 210 and Duo 230, increases the number of shipping PowerBooks to six. On top of all this, Apple has introduced the Performa series through mass-market channels and redesigned most of its peripherals. Remarkably, this proliferation of models has been accompanied by large price decreases.

By any standard, these sweeping changes are an incredible accomplishment. Apple is introducing a broad variety of products with aggressive pricing and letting users choose which computer is best for their work. Apple deserves credit for its willingness to let customers decide what they want. With so many new choices, the big question facing potential buyers is which machine is best for their needs. Last issue *Macworld* covered each new Mac in great detail. This month, I'll grade each new Mac on how well suited it is for its position in the lineup. The grade is not intended as a definitive overall rating but as a quick take. Thorough reviews will have to wait until we can get our hands on shipping units.

A New Classic

THE MOST CONTROVERSIAL CHANGE in the new Mac lineup is the Color Classic. I give Apple points for adding color to a compact Mac, for vastly increasing the convenience of its expansion drawer, and for having the courage to offer a bold new cabinet design that retains most of the

character and virtue of the previous compact Macs' small footprint and all-in-one design. The original Mac is the only desktop personal computer that feels like it has a personality. You may or may not like the new compact design, but it does have personality, and it adds valuable features.

On the downside, the machine is still slow and a little too expensive for its assigned role in the Mac product line. I would have liked the new Classic better if it had been designed around the LC III architecture to revitalize the compact design's performance. Even with the addition of color, a compact Mac ought to cost closer to \$1000. If I were on a tight budget I would still stretch for the LC III with its superior performance and larger monitor. The Color Classic is an interesting alternative, but it needs a tune-up before it's ready to assume its role in the lineup with aplomb. I give this one a C.

The PowerBook 165c

IN ADDITION TO ADDING COLOR TO the Classic, Apple has broken through the PowerBooks' monochrome barrier with the PowerBook 165c. However, on first viewing, I didn't like the color quality of its screen. And neither did any of the other *Macworld* editors who saw it. Passive matrix color just isn't good enough for the Mac. It's clear that Apple wants to meet its customers' demand for a color PowerBook, but this feels like too much of a compromise in screen quality. If you don't absolutely need color, the gray-scale active matrix screen of the PowerBook 180 is a much more appealing display than that of the 165c. Take a look and judge for yourself, but I give the 165c a D solely on the basis of its disappointing screen technology.

The LC III

THE MOST SIGNIFICANT change in the Mac product lineup is that business users can now buy systems with reasonably brisk performance for under \$2000. Only a few months ago I suggested in this space that Apple should offer a business-level machine for under \$2000. Instead of having no

choices at that level, you now have three: the Centris 610, the Mac IIvx, and the LC III. Although the IIvx was introduced several months ago, I include it because it has undergone a tremendous price reduction and because Apple considers it part of the new Centris series. Each of these models offers specific advantages. The Centris 610 is fast, the Mac IIvx is expandable, and the LC III is inexpensive. For me, the LC III is the pick of the litter.

Of all the new Macs, the LC III can't be beat in terms of sheer value. It provides the most sensible balance of price, performance, and expansion for today's computing requirements. It's true that a year or two from now the LC III won't seem quite so frisky, as software makes ever-increasing performance demands. But by then you're likely to have even more appealing price/performance choices from Apple. I give the LC III an A.

The Centris 610

THE CENTRIS 610 HAS ABOUT THE SAME price/performance ratio as the LC III, and about the same expandability. You pay several hundred dollars more, but you get your money's worth in extra performance. Most people will want to save the money and opt for the LC III. I suspect that most users who are looking for the additional performance the 610 provides will also want more expansion capability—not just more slots but also greater availability of options from third parties. The problem with third-party options is that the 610 doesn't accept standard-size NuBus boards. Hopefully, third-party companies will help overcome this limitation and others, such as the lack of a floating-point math chip, by announcing more add-in products for the 610. The 610 makes most sense from one perspective—the need for future performance to handle increasingly large and onerous software. If you plan to adopt the newest software versions and you don't want to deal with the bother of trading up to a faster Mac or adding an accelerator, the 610's extra performance

continues



*The
Centris 650
and the
LC III get
an A*



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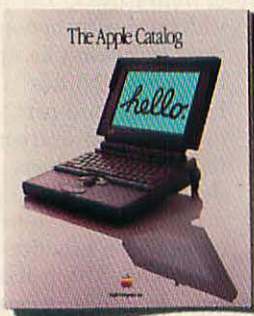


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may pay off down the road. I give the
Centris 610 a B.

The Mac IIvx

I'M LESS CONVINCED OF THE LONG-
term value of the Macintosh IIvx. If you
really plan to use the expansion capability
of the IIvx, you will be investing in expansion
boards and peripherals. As you do
this, the cost of your base machine becomes
a smaller percentage of the total
system cost. Also, internal expansion options
often demand more CPU performance to
support their added capability. It makes less
sense to invest in such options as a 24-bit
graphics board and a video capture board if
your system doesn't offer some growing room
in terms of performance. For this reason I
recommend that users seriously consider the
more expensive Centris 650 if they want a
truly expandable system. However, if you can't
pay the extra price of the 650 but you need
the expandability today, the IIvx is an adequate
alternative. I give it a C.

The Centris 650 and the Quadra 800

APPLE INCLUDES THE CENTRIS 650 AS
part of the midrange Macintosh lineup.
Depending on how you look at it, the
Centris 650 is either at the high end of the
midrange or at the bottom of the high
end. Either way, the 650 has the right
combination of performance and expand-
ability for most business power-users. After
the LC III, the Centris 650 provides the best
set of features for the price in Apple's new
desktop lineup. If you are looking for an
expandable desktop system that can grow
with your needs for some time, the 650 is
the right choice. The Centris 650 gets an A.

At the true high end, the Quadra 800
is the best Mac for most production environments.
This includes color prepress, engineering,
rendering, and other high-end graphics
applications. This impressive level of performance
is more typically associated with the workstation
market than the business market at large. The
Quadra 800 is roughly equivalent in performance
to a Quadra 950 but costs less and is more
compact. Most production users need the power
but not the vast expansion capability of the 950.
With the 800 Apple is offering this performance
for a substantially lower price than ever before.
The Quadra 800 is a good choice for many
production users, so I give it a solid B.

All in all, Apple's designers are doing
an excellent job with CPUs. Apple continues
to offer more choices and apply lower prices
to its entire product line. Let's hope Apple
continues successfully morphing the Mac. **m**

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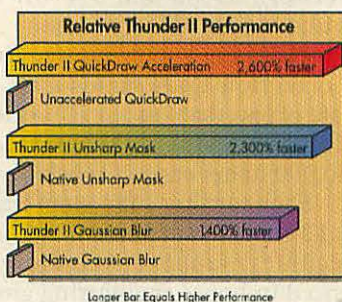
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Letters

MAY 1993

If Apple Won't Fix It, It Ain't Broke

I RECENTLY HAD A MOST UNPLEASANT experience with my PowerBook 170. A crack appeared in the lower-left corner of the screen after the computer, packed in a Kensington padded carrying case and strapped to the backseat of a luxury sedan, accompanied me on a trip.

A technician at a local authorized Apple repair shop decided that the repair (\$1498) was not covered by the Apple one-year warranty. The reason given was that since cracks involving the lower-left corner of the screen had so far not been reported to occur spontaneously, the computer had been "abused." At no time did I drop, bump, kick, beat, or otherwise abuse my PowerBook! There were no signs of external or internal damage other than the cracked screen.

I feel that I have been treated unfairly by Apple. Several phone calls to customer representatives in Cupertino have met with little sympathy.

*Gunter K. von Noorden
Houston, Texas*

I'M A PUBLIC SCHOOL TEACHER. I saved for months, and finally purchased a PowerBook 140 and was thrilled. However, about two months after I purchased it, one trackball button malfunctioned. The next day, the back cover panel fell off. Then, a few days later, the display malfunctioned. Alarmed, I took it to the Apple dealer who called a few days later to say that they had found a crack in the screen. They then accused me of dropping the PowerBook! I always kept it in a protective case and was very careful with it. My grades, tests, and a whole semester's worth of documents were on that machine and I would not have endangered it. After vigorously defending my innocence, I was told that repairs would cost \$790 plus \$90 for labor. That is a month's pay for me! I was also informed that the cover panel and button were not covered, as it

was assumed that they were also damaged when it was "dropped."

I'm writing this as a warning to my fellow schoolteachers who may still have warm feelings toward Apple as our benevolent partner in education.

*Matt Federoff
Tumacacori, Arizona*

Apple says PowerBook owners having problems with their computers should call the PowerBook repair line (800/767-2775), which will ask a series of questions to help diagnose screen damage and help analyze whether the PowerBook has actually been misused, in which case repairs would not be covered under warranty. Readers should know that Apple says a very small number of PowerBooks were affected early on by a variation in the manufacturing process that tended to cause the displays to crack in a specific corner. Has this been a problem for you? Please write and let us know.—Ed.

Half a Tone, Onward

THE NUMBER OF GRAY LEVELS available for a graduated tint has a direct relationship to whether the tint will have banding in it ("Halftones Demystified," February 1993).

Although it is true that PostScript Level 1 addresses only 256 levels of gray, there is no mysterious reason why PostScript Level 2 will address more. Many more levels of gray are necessary to produce long, smooth gradations that have a small percent of change.

*Gordon Hutchinson
Gray, Tennessee*

I spoke with Peter Fink, author of *PostScript Screening: Adobe Accurate Screens* (Adobe Press, 1992; distributed by Hayden Books), to confirm the 256-gray-level limitation. While it's true that PostScript Level 2's internal color engine can work with more than 256 gray levels, its halftoning machinery still resolves that information into 256 gray levels when it creates halftones. It's possible to produce long, graduated tints sans banding, as has been demonstrated *continues*

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by thousands of publications. But how to do it, well, that's a subject for a whole other article.—Steve Roth

CORRECTIONS

Printer Perceptions

IN "WORKGROUP PRINTERS" (JANUARY 1993), you mention that the customized LaserWriter driver extensions that come with several printers are incompatible. This remark requires clarification.

My company has been licensing these extensions to printer manufacturers for a few years, and in the early versions we licensed, the user could have support for only one printer at a time. More recently, we have been licensing software that was designed to support networks of printers from multiple manufacturers.

What the author discovered was that the software that supports QMS printers is the older version and is incompatible with the others. The newer, compatible version has been licensed to Data-products, Compaq, Epson, Genicom, NewGen, and Texas Instruments. QMS is now considering upgrading its software to be compatible.

Marty Joel
Perceptions Unlimited
Calabasas, California

Printer Homage

YOU, IN YOUR INNOCENCE, AWARDED the HP LaserJet 4M printer only four stars (*Reviews*, February 1993)! Jaw sagging in astonishment, allow me to explain how you err greatly.

I am an advertising graphic artist/designer. In November 1992, I purchased a LaserJet 4M for nearly one-sixth the cost of my \$12,000 NewGen 840e (800 by 400 dpi). I added a single 4MB SIMM, and I have never been so overwhelmed by a laser printer. If you awarded six stars, this machine would warrant them.

Bill Horton
Santa Barbara, California

Look Ma, No Docs

MICHAEL HAZEN WROTE THAT HE was pleased to find out he could save \$150 [the price of the HyperCard Developer's Kit] by setting the user level of his bundled HyperCard to scripting (*Letters*, February 1993). The Developer's Kit comes with some very good reference manuals and extra developer-oriented stacks. I can't imagine doing serious development work without them. I'm sure that every software package would be cheaper without documentation, but as they say,

In the March Letters Microsoft's customer-service number should have been 800/426-9400.

In March News APS Technologies' number should have been 816/478-8300.

In the March review of Publish It Easy 3.0, Timeworks' phone number should have been 708/559-1300.

In the March feature "Midsize Hard Drives" we inadvertently left Saturae's Pro 500 out of the Editors' Choice "Best Bargain" category. The Pro 500 drive is fast, reasonably priced, and includes excellent technical support.

The correct number for the BCS Mac bulletin board is 617/864-0712 (Conspicuous Consumer, March 1993.)

"If you think education is expensive, try ignorance."

Also, a response to Joel Alvin Christine and his comparison of the Performa 600 and the IIsi. The IIsi offers an excellent compromise in weight-size versus performance, and the Performa 600 is the ugliest Mac ever made. Joel can have a Performa 600 if he wants one, but I'll be happy with my IIsi until something clearly better comes along.

Laurence Harris
via CompuServe

Remotely Interesting

IN "REMOTE POSSIBILITIES" (JANUARY 1993), you recommended that a purchaser not buy features like V.42bis and MNP 5 because ARA contains data compression. But V.42bis and MNP 5 are hardware-based compression and will work on top of the software compression of ARA. Also, there are very few (if any) modems at 9600 bps or 14,400 bps (the speeds you recommend) that do not come with these compressions.

John C. Sagebiel
Reno, Nevada

DAVID POGUE MENTIONS THAT voice/modem line switchers can be purchased through "various electronics mail-order catalogs." Could you please suggest some sources.

Scott Marshall
via Internet

Try Damark (800/788-7001) or check your telephone book for a local Radio Shack.—Ed.
continues

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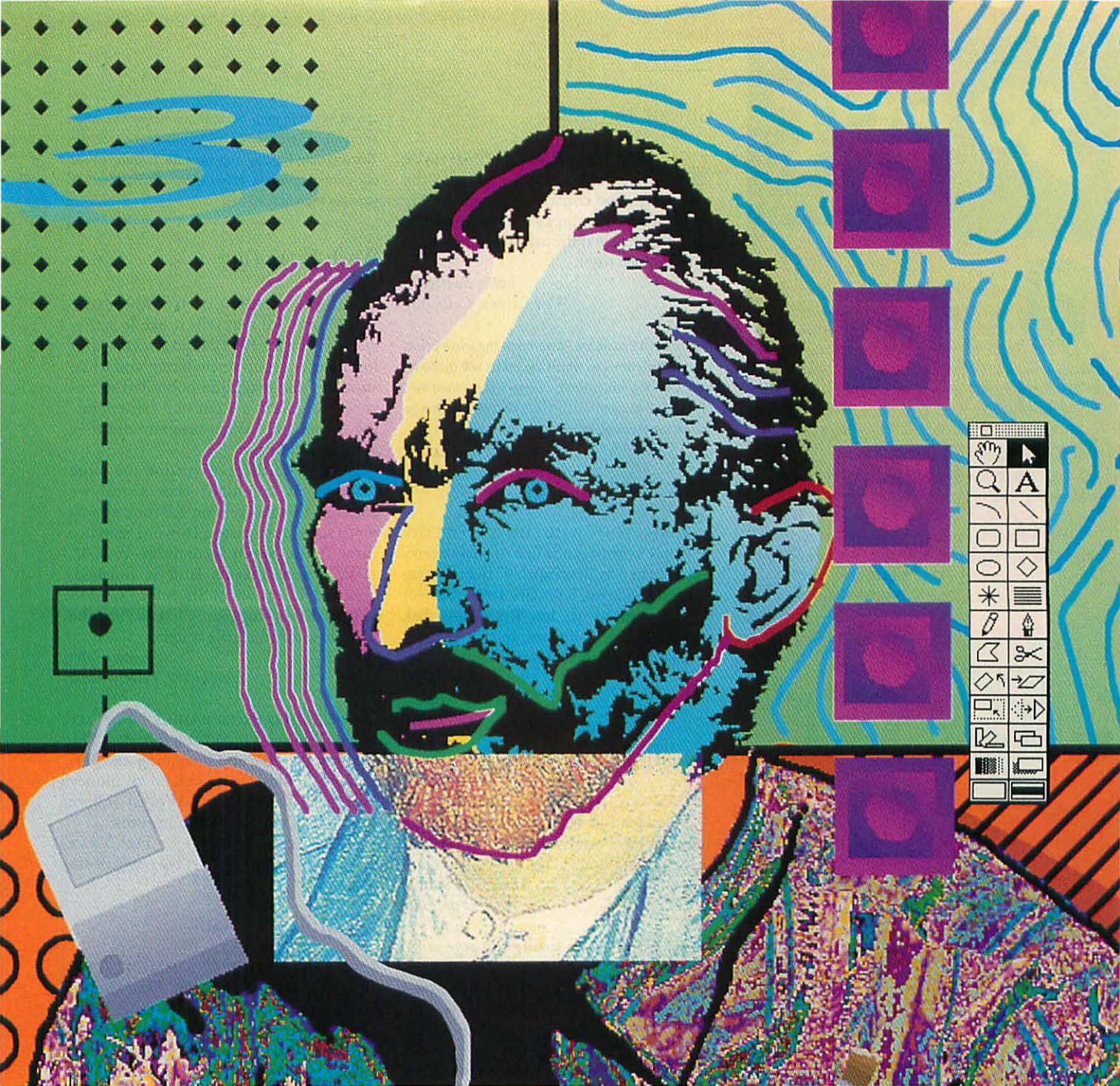
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LETTERS

Cursor Reverser

WHY DOES THE MACINTOSH HAVE the arrow cursor pointing to the upper left-hand corner of the screen? My sister, who is a southpaw, commented that it would be nice if the arrow were to point to the upper right.

James Rodriguez
West Covina, California

Rumor has it that on the PowerBook, the arrow points toward the corner in which the pixels will malfunction. Desktop lefties can try Lefty, a shareware INIT (available through BMUG, 510/549-2684) or change the arrow themselves with ResEdit.—Ed.

New, Not Improved

I WISH YOU WOULDN'T FOLLOW Apple's propaganda line of characterizing System 6 as "less capable" than System 7 (*Getting Started*, February 1993). System 6 allows me to use less RAM, less disk space, run older software, and turn Multi-Finder off whenever I want.

Bruce Long
Tempe, Arizona

Questions, Questions

CAN YOU GIVE ME SOME LOGICAL explanation as to why I received my January 1993 issue of *Macworld* on November 20, 1992?

Mary Ann Stearns
Toledo, Ohio

The top ten reasons the January issue came early:

10. Elves.

9. We thought the feature on color management was essential for a color-coordinated holiday.

8. No, honest, you really got the November issue. It just says January on the cover.

7. Management replaced a broken coffee maker with an espresso machine and nobody noticed until an overcaffeinated designer freaked, grabbed a stapler, and held the art director hostage for two days.

6. So we can send you those heartfelt subscription renewal messages on time.

5. A power surge advanced every calendar program in the building one month.

4. Fanatic subscribers demanded "Another issue now, man!"

3. New Macs and a recent Ethernet upgrade have brought back the giddy magic of picking up a mouse and changing the world.

2. Our "365 Words a Year" desk calendar refills came early, terminally confusing the staff.

1. Just another day's work for our scrupulously efficient U.S. Postal Service.

Actually, most monthly magazines predate their covers by a month for newsstand sales. Stearns re-

ceived her issue early because we mailed the January issue on November 18 in anticipation of the Thanksgiving holiday and because Toledo is near our printing press in Waseca, Minnesota. Truth is stranger than fiction.—Ed.

Work It On Out

FINALLY A REVIEW OF MICROSOFT Works 3.0 that tells it like it is (*Reviews*, February 1993). I did a review of it for my user group's newsletter, and when another Mac magazine published its review and gave it a 4 out of 5 critters rating, I thought, "What program did they get that I didn't?"

I demoed the new version for some students in my night classes and we counted aloud as version 3.0 took almost seven seconds to paste a 16-word sentence three times. Seven seconds! $\$-V$, $\$-V$, $\$-V$. Seven seconds later it finished. Granted, it was on an SE, but to say MS Works 3.0 is sluggish is like saying the Titanic took on a little water.

James Gates
Harrisburg, Pennsylvania

I UPGRADED FROM WORKS 1.0 ON MY Mac Plus to 3.0. What a mistake! The speed is slow beyond imagining and Microsoft should have to refund all money ever paid to them for Works! There should be a lemon law like in autos!

Dick Norick
via CompuServe

Desktop Criticism

DAVID POGUE'S COMMENTS ON DiskQuick are wrong (*The Desktop Critic*, January 1992). I have used DiskQuick for several years without experiencing any of the negatives he mentioned. Even under System 7 I have not had the problem of "ghost" disk icons or of tripping up and stopping. (That was an occasional problem under MultiFinder and System 6.)

Furthermore, DQ has an export function, which I use all the time, since I prefer to keep my floppy disk catalog in FileMaker. This also works fine under either System 6 or 7.

Alan Ullman
via CompuServe

ALTHOUGH IN SEVERAL PLACES IN his January column David Pogue touts his thoroughness, he completely missed FileList+ 1.0b20. It doesn't do labels, but it does just about everything else on which he rates the programs. It is also *continues*

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highly customizable. Since I don't care about labels, I find it a superior product to MacLibrarian, which I looked at after reading his effusive praise.

I help run mac.archive.umich.edu, one of the largest Macintosh File Transfer Protocol sites on the Internet. Our archive is conveniently hierarchically arranged—all disk catalogers (including seven you neglected to mention) are in `/mac/util/diskfile`. I'm not claiming that these are all good catalogers, but they're all available, and in one place. We are accessible from AOL and CIS through our mail server; send a message to mac@mac.archive.umich.edu with any subject line and the single word **help** in the body of the message for instructions.

Jonathan Brecher
brecher@busc.harvard.edu
via Internet

Unbearable Heaviness of Being

AFTER YEARS OF WAITING FOR A genuinely portable Macintosh computer, the Duo has finally arrived. For those of us for whom portability means having to carry our computers on our

shoulders most of the time, and not just to and from the car or plane, weight adds up very quickly.

While we may look forward to buying some of the add-ons and accessories, weight is always one of the crucial factors in our selection. Reviews that fail to list this information leave us critically uninformed. Please make it a standard policy to include weight, as well as dimension and international current information, in all your reviews of portable equipment.

Jeffrey C. Olson
Seattle, Washington

Harsh Words

MAYBE STEVEN LEVY COULD TRY writing reviews without racist comments ("The 1992 Macintosh Game Hall of Fame," December 1992)? According to him, "clever Muscovites" endowed Wordtris with "music only a Ukrainian peasant could love." Come now! Substitute your favorite ethnic minority for "Ukrainian peasant" and how will that sound?

Oleh S. Ihnytskyj
Edmonton, Alberta, Canada

Needs Fulfilled, Desires Realized

AS A COMPUTER LITERACY TEACHER of eighth-grade students, I found Steven Levy's "The Rap on Software Piracy" (*The Iconoclast*, January 1993) to be both a hoot ("Chicka-chicka, scratch! scratch!") and an affirmation of reality—kids do indeed copy like crazy.

Of particular interest to me was the SPA's offer of its free rap video, but I do not know how to contact the SPA.

Mary Roberts
Humble, Texas

The Software Publishers Association can be reached at 1730 M Street NW, #700, Washington, D.C. 20036-4510; 202/452-1600. —Ed.

Letters should be sent to *Letters*, *Macworld*, 501 Second St., San Francisco, CA 94107; via fax, 415/442-0766; or electronically to CompuServe (70370,702), MCI Mail (294-8078), America Online (Macworld), or AppleLink (Macworld1). Include return address and daytime phone number. Due to the high volume of mail received, we can't respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld*. **m**

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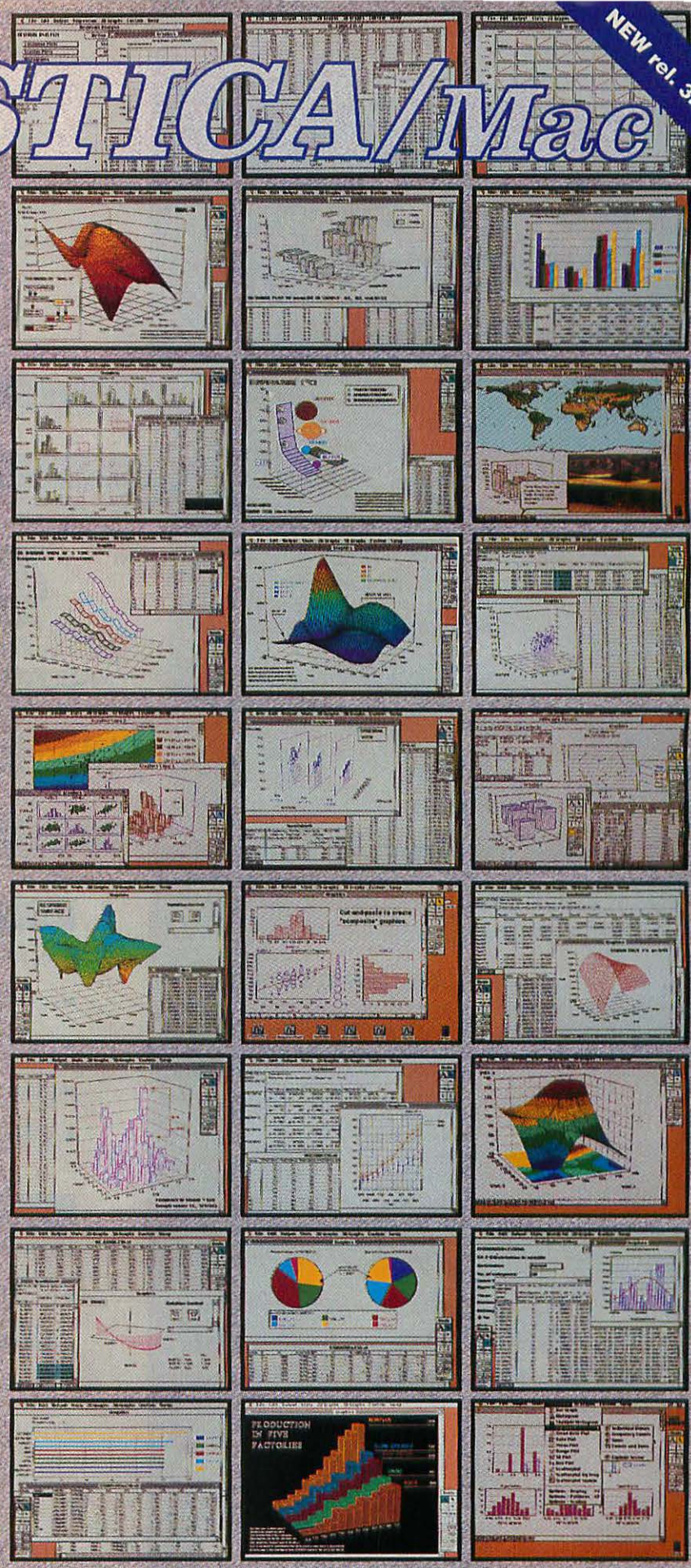
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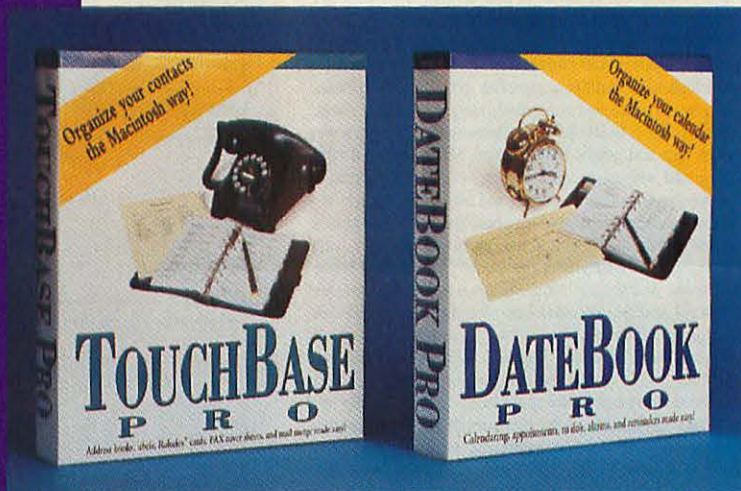
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Let Your Agents Do the Walking

BY STEVEN LEVY

HAS YOUR INFORMATION run amok? Are perfectly delectable data files and documents growing the digital equivalent of hairy green mold because they are tucked into obscure corners of your hard drive? Do you have to perform endless repetitive tasks just to keep your desktop in order? Are there all sorts of file manipulation that you would like to do but don't, because doing it would be an incredible hassle? Are you having problems arbitrating irreconcilable differences between your various computers? Do you feel there are fascinating nuggets of information you are missing by not cruising databases? Are you sick of novels about lawyers?

If you answer affirmatively to all the above except the last (which I tossed in to test reading comprehension), then you are ready to welcome the latest concept in computing: intelligent agents. The term is confusing, since agents are usually people who talk on the phone a lot, casually drop Tom Cruise's name, and tell you the check is in the mail. But intelligent agents are different from that sort of agent in several ways: (1) they are software programs, (2) they work in the background, and (3) they don't take a percentage.

A good definition of agents was provided by the moderator at a recent MIT conference that billed itself as the first symposium to address the subject. "An intelligent agent," he said, "is a semiautonomous computer program that can learn who you are and what you want—like a good British butler." (This moderator, incidentally, was an actor costumed as a butler supposedly named Reeves—very funny, but you had to be there.)

Presumably, agents will be our assistants in assimilating the imposing glut of information that makes our lives miserable. As Reeves put it, "people need less information, not more, [and] the quality and content of that information must be monitored and controlled in such a way that one can conveniently get on with one's life."

Secret Agents

SOUNDS GOOD, HUH? THE BEAUTY OF it is that after a presumably painless period

of educating an agent on its duties, *almost nothing is thereafter required of the user*. Any software agent worth its salt is somewhat autonomous. A mind-reading butler! A better analogy might be a horde of mythical elves who infiltrate your house under cover of darkness and clean up the joint, not even requesting gratuities. Wouldn't you like a team of those elves paratrooping nightly into your hard drive, straightening out your folders and backing up your files? Better still, envision a squadron of elves searching America Online, Usenet, and the electronic version of the *New York Times*, identifying messages and articles of interest, and gathering those nuggets in a file that greets you when you sit down at the Quadra in the a.m.

Can you stand another analogy? A private secretary! Like "My Little Margie" in C++ clothing, your agent will know you as well as—or better than—you know yourself and will use this knowledge to keep your data-based affairs in order. Nicholas Negroponte, the head of MIT's Media Lab, is particularly enchanted with this concept. He outlined the following situation to the symposium. Someone asks for the most recent letter sent to Negroponte by person A. His current response is to push a button on his intercom and ask his flesh-and-blood assistant to retrieve the letter from his files. "But what if that request wasn't to a person, but an agent?" he asked the gathering rhetorically. "In both cases I would be delegating it to an expert—on me."

This expertise will best be employed in gathering useful information and screening out the useless stuff. When performing the latter task, agents will "know" which people you are eager to hear from, and which you want no part of. (Agents will also understand that on certain subjects, you are willing to hear from those ordinarily blacklisted via your bozo filter.) This sort of discrimination will apparently be performed by General Magic's recently announced Telescript protocol for communications, and Apple has made a big deal of announcing that its Newton

personal information devices will also be agent-driven.

The act of gathering information is more challenging for agents. Gigabytes of data lurk in various servers around the world, only a phone call away. Undoubtedly hidden in this massive digital haystack are appealing needles—maybe a factoid or perhaps a figure that will transform your entire existence, if only you saw it! But who has time to look through a haystack?

Agents do. Being software constructs, they have no hobbies of their own, and never visit the dentist. Sometime soon, according to the true believers, these agents will spend their days combing the nets for the sorts of things that interest you. They will even make educated guesses on the sorts of items that you haven't expressed a preference for, but probably would have, if you'd thought of it. How will they do this? Well, a Media Lab researcher named Pattie Maes has come up with an ingenious scheme to allow agents to make uncanny inferences about our reading habits. She has been launching entire populations of agents from her Macintosh, having them scour the backwaters of Usenet for items of potential relevance, and then selecting the most successful agents as stock for a subsequent generation of agents. In other words, she is literally breeding intelligent agents.

Genetically speaking, locating the tastiest information is a matter of life and death for these software beings. The ultimate recipient of this vital struggle is the user, who will automatically receive a digest of news items he or she can use.

There's something utopian about the idea of agents, designed to pamper us with customized clerical services while never burdening us with problems of their own. One speaker at the MIT confab referred to the use of agents as "zipless computing" (to be discussed, no doubt in a future Erica Jong novel, *Fear of Filing*). Indeed, Nicholas Negroponte's talk was dubbed "The

continues



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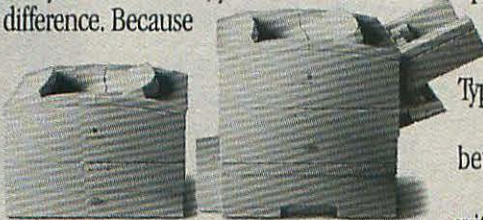
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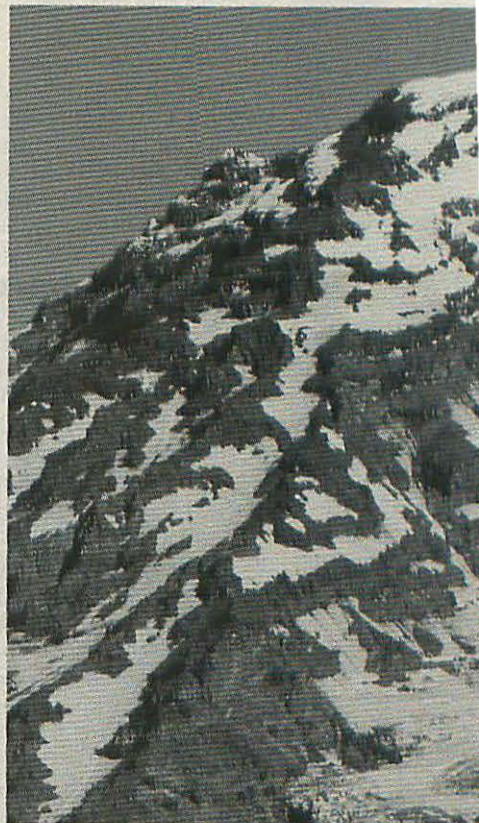


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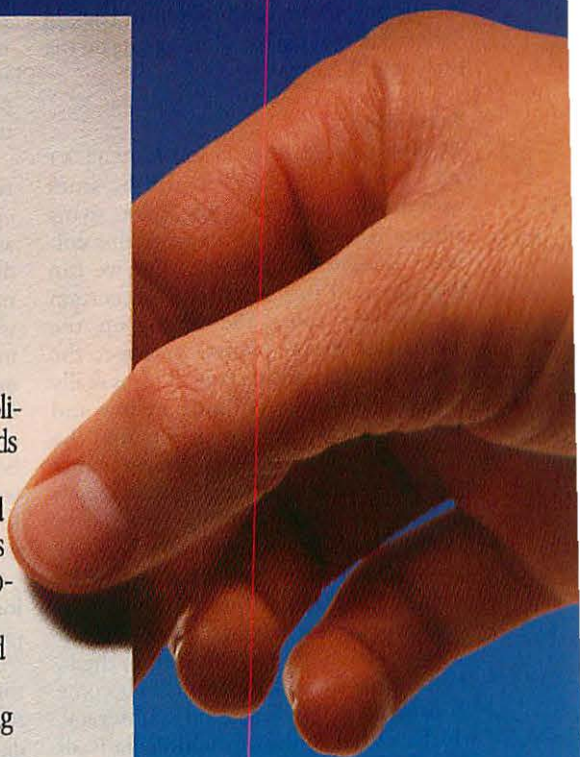
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Best Interface Is the Lack of It." Think of it—instead of dealing with desktops and dialog boxes, one need only lean back in a digital Barcalounger while agents do the dirty work!

Trust Me

TO BE SURE, THERE IS PLENTY THAT agents won't do. We will still be stuck with the heavy mental lifting. (Note to my editors: Agents will never write this column. Budget accordingly.) But we can look forward to liberation from certain tedium—the filing, the tidying up, the taking-out of the digital garbage, the screening of electronic mail. This is really going to happen. As Apple Fellow and professional visionary Alan Kay told the MIT symposium, "Agents are happening whether we like it or not." And he wasn't alone in this assessment.

So what's not to like about agents? Kay himself, while emphasizing that he generally supported the movement toward agents, confessed to worries about society becoming overly reliant on them. It is possible, he said, for agents to become "a prosthetic for a person's illiteracy, which is what much of multimedia is all about." Kay's fear in this case is that

agents, by automating tasks that we previously performed ourselves, will distance us from the instructive reality of those tasks—much in the same way that learning arithmetic with a digital calculator prevents one from truly understanding the mathematical process.

But to me, there's a much more essential issue involving agents. When you delegate a task, either to an administrative assistant, a butler, or a brother-in-law, you do so with the expectation that your surrogate won't screw up. While we have well-established criteria for making judgments on the reliability of fellow humans—and can usually take solace in the fact that if they fail us we can fire them, or at least yell at them—the same cannot be said of software agents. How deeply are we willing to rely on them? Would we allow them to perform duties essential to our jobs? Our lives?

I got a tiny taste of this trust issue not long after I began playing with a new program called Magnet. This application is sold by its creator, No Hands Software, as the first intelligent agent for the Macintosh. Tony Stayner, the company's president, has very cannily poised his Belmont, California, business in the center of the

Next Big Thing in software. He also knows how to talk that talk.

"Magnet is like a personal assistant inside your computer," says Stayner. While he admits that the Magnet agents are crude compared with those to come, he assures me that the agents provided in the application are genuine. "If you give them a set of instructions once, they will perform them reliably—probably forever."

Fatal Attraction

MAGNET IS A WELL-DESIGNED PROGRAM, and I found setup quite easy. Soon I was busily constructing my first agents, or magnets, to perform housekeeping tasks on the shabby digital edifice of my data. One of the first things I asked Magnet to do was organize some capture files from my online sessions on the Internet. I had been following an ongoing newsgroup called cipherpunks (the name comes from their rebel stance concerning cryptography). Since I had been following the thread for several months, I had dozens of files; unfortunately I had not been carefully saving them to the same file, and the files are now dispersed all over my

continues

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hard drive. So I set up a magnet that would locate all the documents with the word *punk* in its file name, and place them in the file named *punk list* that I'd originally set up as a central repository, and which at that time held about 35 files. (I guessed that probably another dozen were somewhere else on the drive.) I instructed the program to dispatch this task every day at noon.

This was done in the late morning. Not long after, I drove to town to eat lunch. When I returned, I checked my Mac to make sure the agent had properly done its duty. I stepped down the hierarchy to the file I'd originally named *punk list* and opened it. To my astonishment, it was empty. Approximately 3MB of information, gathered over two months, had disappeared.

I frantically opened up folders in a futile search for the missing files. Eventually, I did a search with On Location, and to my great relief, the program found the capture files, 46 of them. Where? In the Trash folder.

What happened? As best I can surmise, when I instructed the agent which folder to place the files in, I had capitalized the first letter of the word *punk*, while

the actual file used a lowercase *p*. At the noon hour, my agent had efficiently gathered the files in question, and then searched for the destination folder. But it could not find a perfect match. As with human assistants, the response to this conundrum was a key in determining continued employment. A person facing this dilemma might have realized that the difference between an upper- and lowercase *p* was irrelevant, and would have placed the files in the folder anyway. A less enterprising person would have at least left the files where they were and read a magazine until my return. Only an idiot—or a software program—would have shrugged its virtual shoulders and tossed the files in the trash can.

Needless to say, I performed a complete backup before further testing Magnet, which did prove useful in performing simple tasks like gathering recent work into a single folder containing my current jobs, and synchronizing files so that I had the most recent versions of documents on both my desktop Macintosh and my PowerBook. But I felt compelled to check up on my agent after every spin of the hard drive. A shadow of mistrust had darkened the relationship

between my agent and me.

But don't worry, I'll get over it. The idea of agents is simply too good to discard over a few megabytes of files trashed in error. As Alan Kay said, agents are inevitable, and I eagerly look forward to the day when agents prepare my daily news digest, answer my electronic mail, and automatically send nasty computer-generated letters to the nasty computer-generated letters sent to me by collection agencies. ("I'll have my agent call your agent.")

But before that day comes, allow me to indulge in a bit of uneasiness. After all, the more we entrust to agents, the more things can go wrong. Still, I may be overreacting. After all, I am supremely confident that the meticulously careful people who write and test our software will make 100 percent certain that these agents will not presume to perform any tasks beyond them, especially in areas that might lead to data loss, missed electronic messages, or mishaps in the air-traffic control system.

Yeah, right. **m**

STEVEN LEVY's most recent book is *Artificial Life: The Quest for a New Creation* (Pantheon, 1992).

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From Hype to Reality: A Case Study

BY DEBORAH BRANSCUM

THIS IS THE STORY OF HOW one company developed, marketed, and shipped a significantly flawed product in a new area of Macintosh technology—and what that says about the industry as a whole. The company did many things right—especially in its prompt, honest attempt to satisfy early customers. It also did several things wrong, notably in its misleading advertising and unrealistic product specifications.

Of course the company is scarcely alone in that regard, so perhaps the most telling part of this story is how it illustrates common industry practices. Which makes this a tale of Everyvender and a lesson in Modern Marketing.

Problems Surface

ON NOVEMBER 23, 1992, SUPERMAC Technology announced it was shipping DigitalFilm, "a video production system that makes professional preproduction compositing and postproduction editing possible right from the Macintosh desktop," according to a press release. SuperMac claimed DigitalFilm was comparable to editing systems costing \$100,000 or more.

Aimed at video professionals, the \$5999 board package won raves from beta testers, according to company officials, who announced the technology in 1990. The press release says DigitalFilm "turns desktop video into a professional tool capable of saving hours of time and hundreds of thousands of dollars in offline—and even online—editing suites." Ads for DigitalFilm had a David-and-Goliath slant, visually contrasting a professional editing suite against SuperMac's hardware-and-software bundle, which the company called a studio in a box.

Beta testing began in October 1992; volume shipments took place in December. By Christmas, SuperMac had received bug reports both from DigitalFilm owners and from a reviewer for *MacWeek*. (*Macworld* did not receive a board for review.) The customer complaints were few but fierce, and included beefs about the board itself: problems with Adobe Pre-

miere, the editing software that comes with the board; problems with configuration issues; and problems with QuickTime, according to Jay Torborg, vice president for engineering and product development.

In January, SuperMac confronted the issues head-on. A team of engineers was sent to Los Angeles, Chicago, and New York to visit customers and see their problems in the field. The company also brought a corporate client and his computer system from Dallas to SuperMac's headquarters in Sunnyvale, California, to trace his problems—which SuperMac couldn't duplicate.

The company made some interesting discoveries. Quadras don't actually turn off all the way when you shut them down. So a small percentage of DigitalFilm boards in a small percentage of Quadras "wouldn't reset properly when you turned the machine back on, because the voltage didn't go low enough," says Torborg. Moreover, the problem affected only systems that used 17-inch monitor settings. RAM turned out to be tricky, too. "In the Quadras, the refresh interval is not fast enough to refresh standard-power 16MB DRAMs," says Torborg. Third-party companies make 16MB SIMMs, and last fall it wasn't widely known that Quadras need low-power 16MB SIMMs to avoid system crashes with some applications.

The company also discovered that DigitalFilm's original specification sheet was inadequate in listing system requirements and optimistic in the benefits it promised. As it turned out, DigitalFilm boards demanded a Quadra and a hard drive with a speed of 5400 rpm in order to function well. Memory requirements were greater than SuperMac specified, maximum compression rates were lower, and there were other problems as well.

On February 1, SuperMac went public by sending a letter signed by company president and CEO Michael McConnell to the estimated 200 Digital-

Film owners. The letter announced that DigitalFilm 1.1 was scheduled to be released in March and would solve several flaws, including improper audio-video lip synchronization; the appearance of dropped frames during playback; system crashes during compression or input of so-called noisy source material, and restart problems for Macs connected to 17-inch monitors.

SuperMac should be commended for promptly recognizing the situation. The company halted general shipments as it worked to revamp the product. The frame-dropping problem was because of QuickTime and not SuperMac's fault. But until Apple fixes the problem, SuperMac plans to provide a Premiere export module as a workaround, so playback will be smooth. But wait, there's more: SuperMac has pledged to invest close to half a million dollars in adding five field engineers and additional in-house tech staff to support DigitalFilm and future video products. The engineering department is expanding its test facilities. SuperMac is offering full refunds to any dissatisfied customers. And people who bought DigitalFilm early on can receive CoSA After Effects, a \$1295 digital-compositing package, at no charge.

What Went Wrong

DESPITE SUPERMAC'S BEST INTENTIONS, it sent out a lemon when it shipped DigitalFilm. Where did the company go wrong? Several users I spoke to said the company simply shipped the board too early and without adequate testing. Torborg denies that a longer testing period would have made any difference, and says some beta testers had the product for well over a year. He does say the company didn't have an optimal beta test group, and the sophisticated beta testers didn't find the problems that less-experienced video hands did.

Part of the flap over DigitalFilm is due to different
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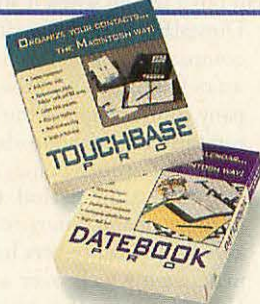
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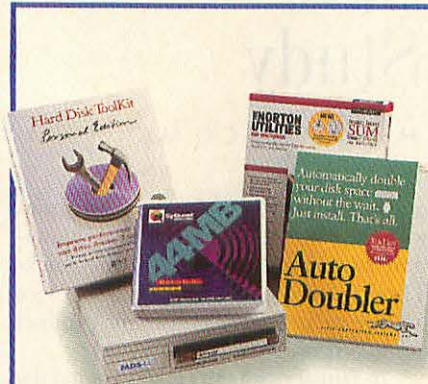
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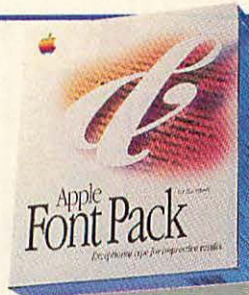
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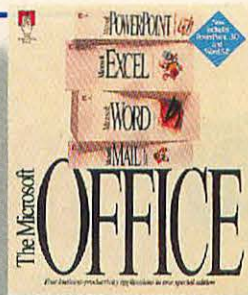


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 ★ **Vertical Solutions ... 60 day MBG**
 5886 *FastLabel*... 55. 3235 *MacLabelPak*... 85.
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 3800 *WordPerfect 2.1.2* 279. 4711 *Upgrd.* 75.
 10773 *WordPerfect Works 1.2* 149.
 ★ **Wordstar ... 30 day MBG**
 6984 *Correct Grammar 3.01* 49.
 3554 *American Heritage Dictionary 1.0* 55.
 10277 *The Correct Bundle (4 programs)* 99.

GRAPHICS & DESIGN PUBLISHING, PRESENTATIONS

★ **Abracadata, Ltd. ... 30 day MBG**
 9990 *Design Your Own Home - Architecture, 9992 Interiors or 9994 Landscape*... ea. 48.
 ★ **Adobe Systems**
 10167 *Adobe Dimensions* 93.
 10289 *SuperATM*... 89. 10423 *Upgrade* 49.
 Adobe *Type Library (Vol. 1-330)* call
 6957 *Adobe Type Reunion 1.0.3* 41.
 6053 *Plus Pack 2.0*... 118. 6098 *TypeAlign* 61.
 4145 *Adobe Premiere 4.29. 3199 Upgrade* 149.
 8171 *Adobe Illustrator 3.2 (w/Dimensions)*... 368.
 5001 *Streamline*... 119. 6644 *Photoshop*... 548.
 ★ **AGFA**
 7971 *AgfaType CD-ROM* 69.
 ★ **Aldus ... 30 day MBG**
 6674 *Aldus Personal Press 2.0* 99.
 2461 *Aldus Gallery Effects 1.01* 128.



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10176 *Fetch* 199. 7541 *IntelliDraw* 194.
 3506 *SuperPaint 135. 4751 Persuasion* 325.
 1330 *FreeHand 3.11* 394.
 7088 *PageMaker 5.0 (Apr. '93)* 579.
 ★ **Altsys**
 1983 *EPS Exchange 89. 1195 Fontographer* 258.
 ★ **Apple Computer ... 30 day MBG**
 3008 *Apple Font Pack* 74.
 ★ **Ares Software ... 30 day MBG**
 8878 *FontMonger 1.5 (Apr. '93)* 93.
 ★ **Broderbund Software**
 3572 *Kid Pix 1.2*... 34. 7293 *Companion*... 23.
 1427 *Print Shop*... 35. 6281 *TypeStyler 2.1*... 126.
 ★ **Claris ... 30 day MBG**
 2518 *MacDraw Pro 275. 8007 Claris CAD* 599.
 ★ **Claris Clear Choice ... 30 day MBG**
 11203 *Brushstrokes* 95.
 ★ **ColorAge (formerly Custom Applications)**
 8037 *Freedom of Press Light 3.03 (17 fonts)*... 84.
 ★ **Computer Associates**
 1668 *Cricket Graph III* 119.

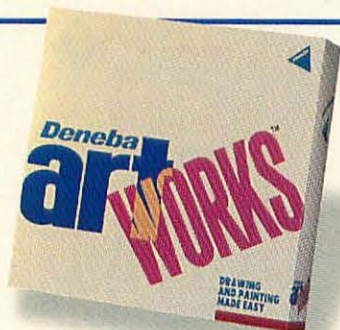


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3558 *DeltaGraph Professional 2.0* 199.
★ **Deneba Software ... 30 day MBG**
11055 *artWORKS 99. 3227 Canvas 3.0.4* 259.
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4870 *Expert Color Paint, 1737 Landscape, 8619 Home, or 1731 Office Design* ea. 29.
★ **Fractal Design**
1068 *Sketcher 1.0* 93. 10402 *Painter 2.0* 265.
★ **Gryphon**
4202 *Morph 1.1* 95.
★ **Letraset ... 30 day MBG**
4709 *LetraStudio 139. 6300 FontStudio..* 359.
★ **Light Source**
3733 *Ofoto 2.0 (Mar. '93)* 275.
★ **Linguist's Software ... 60 day MBG**
2569 *Cyrillic II 99. 2641 Laser Hebrew* 89.
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7651 *Action! Mac 349. 7441 SwivelPro* 479.
3450 *SwivelMan 596. 7653 MacroModel* 999.
★ **Manhattan Graphics ... 30 day MBG**
4990 *Ready, Set, Go! 5.14* 219.
★ **Microsoft ... 30 day MBG**
2878 *PowerPoint 3.0* 295. 10065 *Upgrade* 125.
2565 *Project 3.0* 445. Upgrades call
★ **Postcraft International**
2210 *Effects Specialist 2.0* 89.
★ **Quark**
7612 *QuarkXPress 3.1* 549.



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4962 *Infini-D 2.0* \$699.
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10767 *LOCAL EXPERT* 82.
★ **Synergy Software ... 30 day MBG**
6617 *KaleidaGraph 2.1.3* 149.
★ **Timeworks ... 30 day MBG**
11196 *Publish It! Easy & Color-It DTP Pack ..* 199.
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ClickArt (bitmapped).. 34. or (EPS).... 55.
★ **Virtus Corporation ... 30 day MBG**
4488 *WalkThrough 1.1.3* 309.

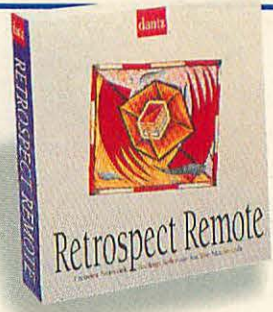
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★ **Abbott Systems ... 30 day MBG**
2515 *Calc+ 1.0.. 36. 5236 CanOpener 2.0* 59.
★ **Aladdin Systems ... 30 day MBG**
7410 *StuffIt SpaceSaver 34. 6740 Deluxe* 65.
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5204 *ALSoft Power Utilities 1.0.2* 62.
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10169 *7th Heaven 2.5* **\$67.**
11191 *Chameleon* **39.**

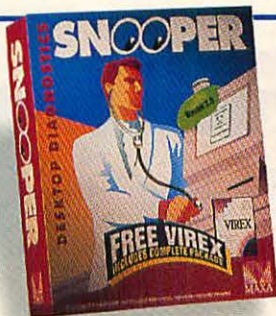
★ **Apple Computer ... 30 day MBG**
1206 *At Ease 1.0* 44.
1074 *System 7.1...* 79. 3413 *MultiPack* 369.
7072 *QuickTime Starter Kit 1.0* 105.
★ **Atticus Software ... 60 day MBG**
9120 *Super 7 Utilities* 64.
★ **Berkeley Systems ... 30 day MBG**
5737 *After Dark 2.0w 28. 2196 Bundle* ... 39.
3392 *Star Trek: The Screen Saver* 34.
★ **Casa Blanca Works ... 30 day MBG**
1593 *Drive 7 2.3* 49.
★ **CE Software ... 60 day MBG**
1727 *CalendarMaker 31. 8024 QuickKeys2* 89.
★ **Central Point ... 30 day MBG**
10595 *Safe & Sound 1.0* 37.
10825 *Mac Anti-Virus 49. 5041 MacTools* 105.
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★ **Clarix Clear Choice ... 30 day MBG**
11205 *Retrieve It* 60.
★ **Connectix ... 30 day MBG**
8441 *CPU* 49. 10765 *Virtual 3.0* 49.
10764 *CPU/Virtual 3.0 Bundle* 59.
★ **Coral Research**
7310 *TimeLog* 62. 7309 (10 Pack) 399.
★ **Dantz Development ... 30 day MBG**
9115 *DiskFit Direct 1.0* 29. 3393 *Pro* 72.
5255 *Retrospect 147. 7945 Remote 2.0* 264.



★ **Dantz Development ... 30 day MBG**
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4803 *Virex/Mac or 8561 911 Utilities* 62.
★ **Delta Tao Software**
10755 *WonderPrint* 36.
★ **Fifth Generation ... 30 day MBG**
4287 *PYRO! 4.01 27. 3955 Suitcase 2.1* 53.
7404 *DiskDoubler 52. 4838 AutoDoubler* 58.
10398 *CopyDoubler 39. 7704 Public Utilities* .. 98.
8286 *SuperLaserSpool 3.0* 99.
★ **FWB, Inc.**
7929 *Hard Disk ToolKit Personal Edition 1.3* . 49.
2999 *Hard Disk ToolKit 1.3* 125.
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6296 *Intermission.. 27. 3731 OnCue II* 63.
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9843 *Inline Sync 1.0* 79.
7068 *INITPicker* 49. 10731 *PBTools* 62.
2913 *Redux 1.63 .. 49. 1740 Deluxe* 92.
★ **Insignia Solutions**
7552 *RapidTrak* 58.
★ **Kent Marsh Ltd. ... 30 day MBG**
9513 *FolderBolt 71. 1839 NightWatch II* 89.
10498 *FolderBolt/NightWatch II Bundle* 129.
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10312 *AntiVirus for Mac 3.5 (SAM) Upgrade* ... 24.
6748 *Norton Utilities for Mac 2.0* 95.
9957 *THINK Reference 89. 2688 THINK C* 199.
★ **Teknosys**
5203 *Help!* 88.
★ **TGS Systems ... 60 day MBG**
6667 *Prograph 2.5* 299.
★ **Thought I Could ... 30 day MBG**
4843 *Wallpaper 37. 10839 More Wallpaper* 25.
★ **UserLand Software**
4753 *Frontier 2.0* 185.

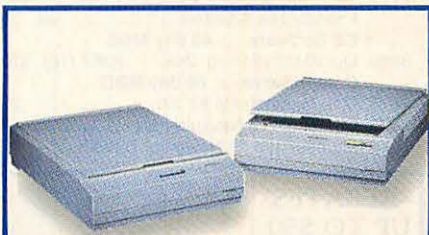
to shed some light.



★ **MAXA Corporation ... 30 day MBG**
10771 *Snooper 2.0 Hardware & Software Kit*—Hardware diagnostic performs over 250 tests on your system's hardware. Snooper runs benchmarking tests, includes an emergency diagnostic boot disk & more! **\$179.**

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1039 *Shanghai II* 29.
1134 *Lost Treasures of Infocom Vol. I* 40.
2470 *Lost Treasures of Infocom Vol. II* 29.
★ **AMTEX Corporation ... 30 day MBG**
2517 *TRISTAN Pinball* 33.
★ **Baseline Publishing ... 30 day MBG**
7785 *Talking Moose 4.0.2* 22.
Broderbund Software
9059 *Arthur's Teacher Trouble* 41.
Carmen Sandiego Series (CP) ea. 29.
8285 *Where's World Carmen Sandiego Deluxe* 47.
Buena Vista Software
1711 *Heaven and Earth* 34.
★ **Carina ... 30 day MBG**
7761 *Voyager II, the Dynamic Sky Simulator*.. 99.



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5441 *ScanMaker IIx* **1239.**

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8525 *Casino Master*... 39. 8524 *(Color)* 45.
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11188 *Pax Imperia* 30.
Colorado Spectrum
2554 *Mouse Yoke (aircraft yoke adapter)* 29.
★ **Cyan ... 30 day MBG**
6320 *Manhole 1.6* 19.
★ **Davidson & Associates ... 30 day MBG**
10953 *Kid Pictures 19. 3922 Talking Spell It +* 28.
2574 *MathBlaster Plus or 7942 Kid Works 2..* 34.
Delta Tao Software
2536 *Spaceward Hol or 2439 Strategic Conq.* 36.
EARTHQUEST
8050 *EARTHQUEST or 3118 Ecology 1.0* 34.
★ **Edmark Corporation ... 30 day MBG**
7155 *Kid Desk 24. 7318 Millie's Math House.* 29.
Electronic Arts
1907 *PGA Golf*... 39. 2963 *StarFlight II*..... 39.
2805 *PGA Golf Tournament Course* 18.
★ **Expert Software ... 30 day MBG**
6219 *Expert Astronomer 1.0* 29.
Graphic Simulations
8083 *Missions at Leyte Gulf (req. Hellcats)*.... 20.
4756 *Hellcats Over the Pacific 1.0.3* 38.
★ **Great Wave ... 30 day MBG**
6693 *KidsMath 2.0 or 2276 Kid's Time* ea. 25.
8527 *NumberMaze or 3471 DaisyQuest.* ea. 35.
1513 *ReadingMaze (Color, ages 3-7)* 35.
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(Span., Fren.) ea. 32. *(Germ., Chin.)* ea. 38.
★ **Inline Design ... 30 day MBG**
1562 *3 in Three*... 31. 7652 *Cogito* 37.
1944 *Swamp Gas* 31. 1747 *Europe* 37.
7646 *Tinies or 7650 S.C.OUT* ea. 37.
Innerprise
1662 *CyberBlast* 25.
Interplay Productions
1894 *BattleChess* .. 29. 1893 *CheckMate*.. 31.
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9570 *Reader Rabbit 2 1.0 (ages 5-8)* 34.
3281 *The Writing Center 1.0* 51.
★ **Leister Productions ... 30 day MBG**
7126 *Reunion 3.0* 115.
★ **Maxis ... 30 day MBG**
11272 *SimAnt or 11273 SimCity Supreme.* ea. 35.
11270 *SimLife*... 39. 11271 *A-Train*..... 39.
★ **MECC ... 30 day MBG**
3960 *Number or 3959 Word Munchers* ... ea. 18.
3963 *Oregon Trail 1.1* 28.
★ **Microlytics ... 60 day MBG**
7871 *Berlitz Interpreter* 34.
MicroProse
9520 *Civilization: Sid Meier's* 39.
★ **Microsoft ... 30 day MBG**
2868 *Flight Simulator 4.0 (CP)* 42.
★ **Nordic Software ... 30 day MBG**
8257 *Preschool Pak* 34. 7470 *Jungle Quest* 30.
★ **Penton Overseas ... 30 day MBG**
VocabuLearn/ce Levels I & II (Span., Fren., Germ., Ital., Rus., Japan., & Heb.) ... ea. 35.
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★ **Personal Training Sys. ... 60 day MBG**
Training for System 7, Excel, Lotus 1-2-3, Persuasion, FileMaker Pro, PageMaker,



★ **Aladdin Systems ... 30 day MBG**
6740 *StuffIt Deluxe 3.04—1992 MacUser's Eddy Award Winner for Best Compression.* "Anyone who needs compression tools...should have this package. Period." (*MacUser* 3/93) **\$65.**
7410 *StuffIt SpaceSaver 3.4* 34.

Illustrator, FreeHand, Word, HyperCard, QuarkXPress, ClarisWorks & Mac.. ea. 49.
Pluma, Inc.
8695 *Capitalist Pig* 34.
★ **Que Software ... 30 day MBG**
9743 *Typing Tutor V* 29.
Sierra On-Line
9078 *Stellar 7*... 15. 7396 *Red Baron* 39.
★ **SoftStream ... 30 day MBG**
4489 *Galactic Frontiers (1 to 4 players)* 38.
Software Toolworks
4619 *Mavis Beacon Typing 2.0 (CP)* 29.
★ **Spectrum Holobyte ... 30 day MBG**
3464 *Tetris*... 22. 3017 *Wordtris 1.0* 28.
4835 *Super Tetris* 28. 9113 *Falcon Color* 39.
★ **Strategic Studies ... 30 day MBG**
3287 *Warlords (empires at war)* 34.
StudyWare
ACT, GMAT, GRE or SAT Prep ea. 29.
★ **Toyogo ... 30 day MBG**
7624 *NEMESIS Go Master* 35. 7623 *Deluxe* 99.



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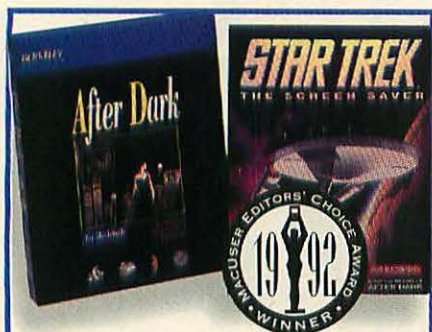
11258 *Editing Aces Suite/Digital Video Solution*—RasterOps' single-slot solution for full-motion digital video recording, playback, CD quality sound and print-to-tape. Includes *MediaTime*, *MoviePak* and the *VideoExpander II* **\$3499.**



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 3392 *Star Trek: The Screen Saver—1992*
MacUser Editors' Choice Award for Best Desktop Diversion. Beam aboard the Enterprise to prevent screen burn-in \$34.
 5737 *After Dark 2.0w* 28.

Velocity
 2934 *Spectre*..... 34. 5280 *LAN 3-Pak*..... 57.
Warner New Media
 11008 *Desert Storm 27*. 11007 *Word Tales* 39.
 11015 *View from Earth*..... 54.

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 9114 *Songworks 1.0*..... 64.
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 7007 *Voice Record 56*. 2034 *Voice Impact* 79.
 7013 *Voice Navigator SW w/Headset Mike*.. 319.
 7014 *Voice Navigator SW w/Desktop Mike*.. 319.
 11048 *Voice Navigator II with Headset Mike*.. 469.
 9975 *Voice Navigator II with Desktop Mike*.. 469.
Coda Music Software
 8188 *MusicProse 2.1* 189. 5604 *Finale* 549.
★DIVA Corporation ... 30 day MBG
 3011 *VideoShop 1.0*..... 369.
E-Machines
 9067 *ColorLink LC*..... 479.
 9070 *ColorLink DC/T*..... 510.
 10321 *ColorPage T16II*. 1299. 9064 *T19II*. 2299.
 9072 *Double Color LX*.. 639. 9073 *SX*.. 359.
 9066 *Futura SX*.. 479. 9065 *Futura MX*.. 799.
Envisio
 4106 *Quick-16*..... 399.



Articulate Systems, Inc.
Voice Navigator SW—Voice Recognition Software for all sound capable Macs \$319.
Voice Navigator II—Voice Recognition Hardware & Software for all Macs 469.
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Macromedia
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 4598 *MacRecorder Sound System PRO*..... 239.
 5087 *MacMind Director 799*. 2246 *3-D 999*.
NEC
 4252 *MultiSync 3FGx*..... 689.
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Passport Designs
 10362 *Passport Producer 299*. 8250 *Encore 379*.
Radius
 1738 *PrecisionColor Pivot (reqs. interface)*.. 999.
 7870 *Rocket 33*..... 2199.
 1736 *PrecisionColor Display/20*..... 2499.
RasterOps
 8944 *RasterOps 24STV*..... 799.
Sigma Designs
 6944 *Power Portrait (platinum)*..... 679.
Software Toolworks
 5201 *The Miracle (piano teacher)*..... 349.
Sony
 10530 *14" Multiscan Trinitron Monitor*..... 689.
 10529 *17" Multiscan Trinitron Monitor*..... 1149.
Sound Source
Star Trek: Original TV Vol. 1 or 2... ea. 30.
Star Trek: Next Gener. Vol. 1 or 2... ea. 35.
 1759 *AudioClips: 2001 A Space Odyssey*..... 35.
★SuperMac Technology ... 30 day MBG
 4122 *VideoSpigot LC 255*. 4164 *(for NuBus)* 379.
 7676 *VideoSpigot Pro or 3691 Pro si*... ea. 1099.
 9074 *Spectrum/24 PDQ+*..... 1649.
 10286 *Spectrum/24 Series IV*..... 889.
 7679 *Spigot & Sound*.. 489. 7678 *Pro*... 1189.
 7677 *17" SuperMatch Multimode*..... 1249.
 1805 *20" SuperMatch Color Display*..... 1599.
 4720 *21" Platinum Two-Display*..... 1099.
Warner New Media
 11024 *Beethoven: String Quartet #14*..... 44.
 11028 *Magic Flute 44*. 11026 *The Orchestra* 54.

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 10330 *From Alice To Ocean Book (w/CD-ROM)* 39.
Broderbund
 3730 *Just Grandma and Me*..... 34.
CD Technology
 2321 *CD-ROM Caddy*... 11. 2533 *(5 Pack)*. 49.
 4084 *America Alive! (CD-ROM)*..... 75.
 8057 *Porta Drive (CD-ROM)*..... 619.
Creative Multimedia Corp.
 11001 *The Complete Works*..... 29.
 11004 *The Complete Audubon*..... 45.
 8744 *Total Baseball 40*. 2484 *Family Doctor* 45.
 11003 *Family Doctor HyperCard Version*..... 45.
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 1343 *Manhole 23*. 2717 *Cosmic Osmo 1.1* 37.
★Highlighted Data ... 30 day MBG
 7771 *Webster's Dictionary*..... 149.
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 Berlitz *Think & Talk*..... ea. 125.
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 3717 *Sherlock Holmes, Consulting Detective* 44.
Interplay Productions
 7111 *Battlechess CD-ROM Enhanced*..... 45.
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 9967 *Nautilus Mini-Subscription Kit*..... 20.
 4007 *World Almanac & Book of Facts 1993*... 50.
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Image Series Vol. 1-4..... ea. 105.
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 6577 *CDR-37 CD-ROM Portable Drive*..... 439.
 6582 *CDR-74-1 CD-ROM Drive*..... 629.
 4146 *CD Express (with CDR-25)*..... 429.
 4132 *MultiMedia Gallery (with CDR-74-1)*... 865.
Peripheral Land, Inc. (PLI)
 10923 *Multi-Session Photo CD-ROM Drive*... 699.



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Software Toolworks
 10308 *US Atlas 34*. 4397 *Time Table/History* 49.
 3915 *Grolier Encyclopedia*..... 249.
Wayzata Technology
Font Pro Vol. 1 & 2..... ea. 62.
 8219 *CD Fun House 35*. 10188 *Macnificent 7* 48.

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 7101 *AppleTalk Remote Access*..... 149.
★Applied Engineering ... 30 day MBG
 8362 *QuadraLink*... 269. 10361 *DMA*..... 399.
★Argosy Software ... 30 day MBG
 7872 *Software Bridge/Mac 2.0.1*..... 99.
Asanté Technologies, Inc.
Full line of Ethernet Adapters..... call
 2775 *10/T Hub-8 249*. 2772 *10/T Hub-12* 499.
Friendly Net Adapters..... ea. 79.
★CE Software ... 60 day MBG
 8066 *QuickMail (5 user)* 249. 8067 *(10)* 375.
★CompuServe ... 60 day MBG
 1676 *Mac Membership Kit 2.0*..... 25.
 1673 *CompuServe Navigator 3.1*..... 49.
 1674 *Membership Kit/Navigator Bundle*..... 72.



★Dove Computer ... 30 day MBG
 9634 *DoveFax+ Voice*—Features a 9600 bps S/R fax, a 2400 bps modem plus a voice answering system \$299.
 10200 *DoveFax Pro+ Voice*—A 14.4 Kbps S/R fax & modem plus a voice answering system . 499.



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Dear MacConnection,

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thinks too frequent), I called you for software to correct the glitch before my next flight. Instead, like some 911 operator, your representative talked me through a detailed procedure to cure my Mac. The problem was quite specific, and I would not have been pleased had I bought an entire pro-

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- 8009 PowerKey 2.01. 75. 8008 Remote \$32.
Thunderware
 4994 LightningScan 400 359. 3107 Pro 256 489.
WACOM
 9110 Tablet (6" x 9") 499. 9109 (12" x 12") 725.

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 5290 Plus Drive (FDHD for Plus & SE) 299.
 TransWarp Series: Does not incl. FPU
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 10283 LC (33 MHz) 425. 10282 (40 MHz) 559.

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Does not include optional math chip.

- 8556 FastCache IIci 223. 10933 Charger 869.
 1613 FastCache 040 (Quadra 700 or 900) .. 279.
 8785 FastCache 040 (Quadra 700, 900, 950) 409.
 PowerCache for SE/30, II, IIx, IIcx, IIci, IIsi, LC
 40 MHz 589. 50 MHz 769.

E-Machines

- PowerLink DeskNET (Thin, 10/T) (Apr.) ea. 609.
 10322 PowerLink Presenter (Apr. '93) 435.
FWB, Inc.

- 7567 PocketHammer 80 449. 7566 PH 120 559.
 9529 PocketHammer 170 599. 2314 PH 240 739.
 7570 hammer 80is.. 299. 7579 Int. 120is. 399.
 7991 hammer1000FMF 1959.

IOEMGA

- 6499 90 MB Transportable (reqs. interface). 659.
 2467 90 MB Gold Std. Rem. Cart. (Qty. 3) ... 439.
 7789 Mac 1B Interface (w/Central Pt. Backup) 39.
 8781 Mac Transportable 90 PRO 499.
 10500 21 MB Floptical Drive 489.
 10499 Transportable MultiDisk 150 799.

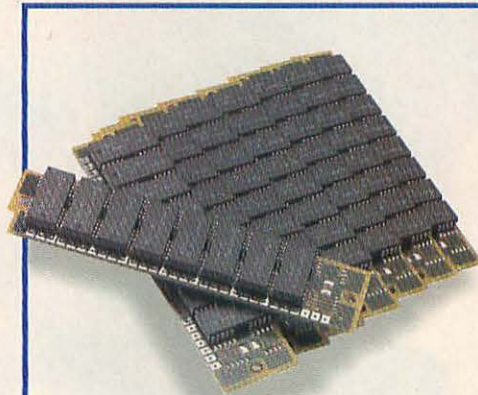
MASS Microsystems

- 2973 120 MB HD 479. 2972 210 MB HD 639.
 3678 120 MB Port. HD 449. 3663 210 MB.. 559.
 10848 Datapak 88c 649.
 7008 HitchHiker Portable Drive (120 MB) 749.

*MDS Drives ... 60 day MBG

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 MDS 88 SyQuest w/SW & cartridge ea. 539.
 MDS 88c SyQuest w/SW & cartridge ea. 649.
Peripheral Land, Inc. (PLI)

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 8327 PLI Infinity 40 Turbo 579. 9752 88 ... 619.
 2864 PLI Infinity Floptical Drive (21 MB) 399.
 10926 1 GB Drive.. 1949. 10849 170 MB.. 549.
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*SyQuest ... 60 day MBG

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TEAC

- 7671 CT600H 60 MB.. 16. 7672 150 MB ... 24.

*3M ... 60 day MBG

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- 3447 SurgeArrest Plus 39.

*Apple Computer ... 30 day MBG

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 7748 Personal LaserWriter Toner Cartridge .. 75.
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*Curtis Manufacturing ... 30 day MBG

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*DOUBLECASE ... 30 day MBG

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*Kensington (full line) ... 30 day MBG

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 4973 Power Tree 20 24.
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- 8719 EtherPrint or 9888 (10BASE-T) ea. 339.
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- 2300 Smartcom II Mac 84. 3226 Upgrade 44.
- 5971 OPTIMA 24 145. 5970 OPTIMA 96 389.
- Insignia Solutions**
- 7557 Access PC.. 59. 3441 SoftNode 2.0.. 99.
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- 9849 SmartPack 9600 (with Smartcom II) 349.
- 11044 PM9600FX MT FaxModem 269.
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- ★ **Software Ventures ... 30 day MBG**
- 1964 MicroPhone II... 139. 3455 Pro..... 209.
- Sonic Systems, Inc.**
- 7572 LaserBridge 135.
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- ★ **Zoom Telephonics ... 30 day MBG**
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- 7757 Fax/Modem AFX (9600S/4800R) 74.
- 2310 FX9624 Send/receive Fax/Modem 99.
- 3576 FX9624V Send/receive V.42 Fax/Modem 128.
- 2311 V.32 Modem.. 199. 4698 V.32bis 229.
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- 1884 LabelWriter II.. 185. 1880 Plus 239.
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- ★ **Curtis Manufacturing ... 30 day MBG**
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- 9471 A3 Mouse 74.
- NEC**
- 5377 SilentWriter Model 95 1439.
- ★ **Orange Micro ... 30 day MBG**
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- ★ **Pacific Data ... 60 day MBG**
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- 7959 LaserJet IV 4 MB 165. 7966 (4 Pack) 599.

perceptions among different users, according to Torborg. He says the more sophisticated users were more forgiving of DigitalFilm's shortcomings because they spend hundreds of thousands of dollars on video equipment. "They knew this little product that cost \$6000 was a steal; even if it had a few of these little quirks, it was still great," Torborg says. "Whereas to the broader range of customers, \$6000 is a really expensive Mac product, and they expect it to do everything. So I think part of it was just the expectations, the mind-set of the customers."

The expectation problem that Torborg alludes to, the gap between hype and reality, was not really the fault of the users but of SuperMac. After all, the company suggested DigitalFilm was an editing system for professional-quality video production, equal to a \$200-per-hour editing suite. The original product specifications claimed DigitalFilm supported full 30-frames-per-second video capture, for example, and could output directly to a videotape recorder at the same rate. But that's not true. Each frame has two fields; true 30-frames-per-second capability captures 60 fields per second. DigitalFilm captures 30 fields per second, resulting in a lower-quality image than that offered by

professional systems. Despite the advertising hype and marketing fanfare, DigitalFilm was not the professional tool video producers had been waiting for, according to four users I interviewed.

Of course, four is a very small number, and few customers returned their boards, according to SuperMac. Apparently many customers are happy with the product, including some high-profile, high-end users. Even the former DigitalFilm owners I spoke to harbor no ill will toward SuperMac. "I still would buy a SuperMac product and I feel they've handled it pretty well," says Michael Weiner, a video producer in Maryland. DigitalFilm "didn't work for me, but I believe that there is a market for it," he says. "I believe there are some people who will be very happy with the product."

But ask him—and others—about SuperMac's marketing campaign and they turn cranky or resigned. *Hype* is the most polite term bandied about—*misleading* and *dishonest* are also used. "The future is what SuperMac promised but didn't deliver," says Mario Acerra, a producer in Pennsylvania. "People were willing to sit through all these delays because they wanted to believe. [DigitalFilm] didn't do at all what

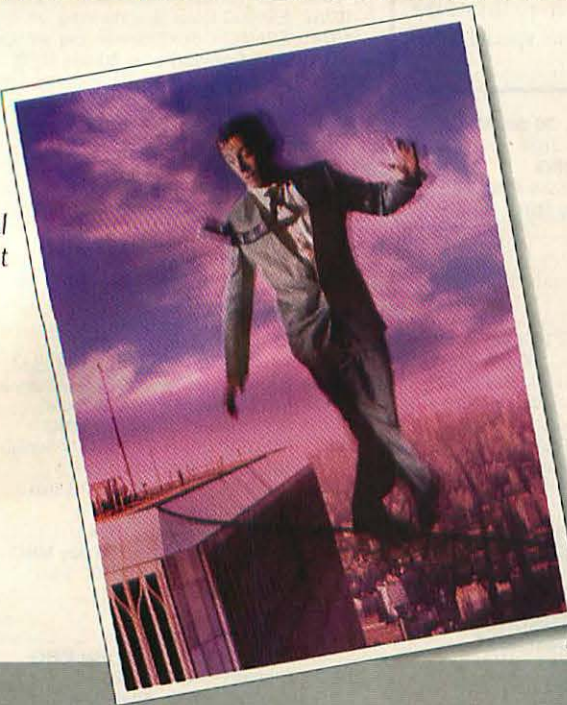
[SuperMac] said it would do, because [SuperMac] didn't understand video or they understood video but that was the best they could do."

It may be that SuperMac is too new to the market to understand how the needs of video professionals differ from those of computer users. "I think computer people are so excited to see these little dancing figures on their screen, it seems like such a miracle," says Acerra. "But it's not a miracle to us; we see them every day and it doesn't really matter to us if we see them on a computer screen or a video monitor." Because Acerra makes his living in video, his professional tools need to perform as advertised.

Company head McConnell recognizes the disparity between DigitalFilm's performance and SuperMac's claims about it. "There were bugs in the product, so we stopped shipping it; we're fixing the bugs, it'll start shipping in a couple of weeks. That's kind of obvious," says McConnell. "In general, you state as strongly as possible how wonderful your product is and how much it'll do for you. That's just good marketing. With a new category of product that is doing so many things that have never been done before, I think, in retrospect, it would have been

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better to understate what it's capable of doing." According to McConnell, the company plans to "pull back the level of hyperbole."

As McConnell explains it, marketing wasn't a problem so much as the inexperience of users. "If you open a can of Miller beer, the world doesn't start snowing," says McConnell. "When I see the ad, I know that. But if I'm hot, it cools me off. OK, I understand—I can translate. . . . In that situation, I know what beer is, I know what hot days are, I know what happens. It's different with a new category of product where people don't know what to expect and have no way of calibrating the kind of sizzle with the steak. So . . . we should tone down the marketing claims."

"But in general, I don't plan to do that with other kinds of products because I think one of the things we do well here is create a lot of excitement about our products," says McConnell. "I just think in this one specific instance, when it's a new type of product . . . we should tone it down until after people have used it for a while and understand what's really going on."

Lessons for Consumers

ALTHOUGH THIS COLUMN CONCENTRATES on SuperMac, the issues it raises are

industry-wide. Last year, for example, RasterOps was forced to send out PROM board upgrades to some CorrectPrint 300 printers because they were shipped without the JPEG compression listed on the product data sheet.

Which means the most important lesson to be learned from the case of DigitalFilm is buyer beware. Marketing hype is just that. Advertising, promotional pieces, and spec sheets are designed to put products in the best possible light and can't always be taken as gospel.

It may seem obvious, but don't make a substantial purchase based on advertising alone. Educate yourself. Read computer publications, talk to other users, go to a dealer and take the product for a test run. And make sure anything expensive can be returned for a full refund if it doesn't meet your needs.

Other lessons to consider:

- The fact that you saw a product do something during a demo doesn't mean it will do the same thing when you get it home. Like promotional literature, product demos are supposed to highlight a product's features, not its flaws.
- The fact that a product has been announced or advertised doesn't mean it exists yet. Ads must be placed four to six

weeks before they appear in monthly publications, which means vendors may believe a product will be available by that time without knowing for sure.

Moreover, companies sometimes run ads as a form of market research, to see how much demand exists for a particular product before they fully invest in it. In other cases, ads may be a response to competitive pressures. When product delivery is uncertain, some companies may advertise the product anyway, because they expect their competitors to do so.

• Good companies respond to complaints. A measure of a good company is not whether it makes mistakes—because we all do—but how it rectifies those mistakes. After complaints surfaced, SuperMac began working to satisfy DigitalFilm owners.

In the end, marketing hype is a fact of life that few consumers can avoid. You can fight back by educating yourself about the technology, the products, and your true needs. **m**

Send nominees for sainthood to Service Heroes, Macworld, 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop *Conspicuous Consumer* a line if a company is ignoring you.

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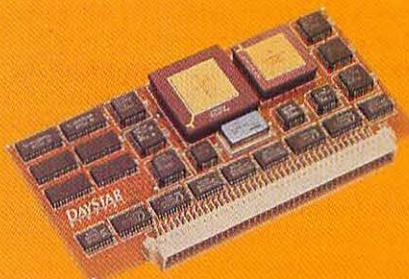
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Painter 2.0 GRA0412 \$279

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Publisher: Berkeley Systems

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UTI0315 \$35

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Publisher: Teknosys
UTI0251



\$89



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Winner of the 1992 MacUser Eddy for Best 3D Package! Infini-D 2.0 combines a friendly interface with 3D power: instant conversion of EPS files into 3D objects, awesome animation capabilities, and QuickTime support. Infini-D is the 3D package of choice for graphics and multimedia professionals.

GRA0303 \$699



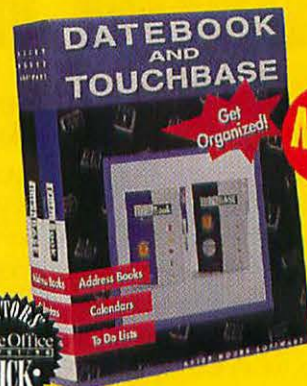
BackBurner*

BackBurner is the distributed network renderer for Infini-D. But BackBurner alone, or add an unlimited number of BackBurner Engines and watch the magic of parallel processing burn up your rendering time! Includes a FREE Engine!

GRA0436 \$369*

Publisher: Specular
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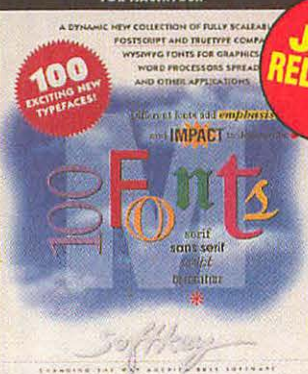
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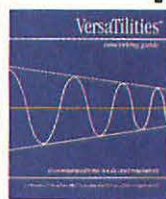
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Telnet and FTP (Client/Server) on LocalTalk, Ethernet and Serial (via SLIP) networks.

VersaUtilities' SLIP support enables Mac users to remotely access the Internet by dialing into a SLIP server. Publisher:

Synergy
COM0140

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Publisher: Maxa
UTI0353

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*You may need Adobe Type Manager® to print to non-PostScript® printers.

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Lab Notes

Running the Gamut of Color Matching

BY MARK HURLOW

IN THE PAST, WHENEVER MACWORLD Lab needed to compare color printers' color gamuts (their ranges of available colors), we had a consultant measure color values from sample output with a spectrophotometer and download the measurements via a telecommunications program such as MicroPhone from the test instrument to the Mac, where we exported them to a charting program. Comparing two printers' gamuts was hard; it meant printing a chart for each, as a transparency, and placing one chart over the other. This method is flawed, though, because a color gamut is three-dimensional (encompassing lightness, chroma, and hue) and doesn't reproduce accurately in 2-D form. Moreover, comparing the gamuts of a printer and a monitor was nearly impossible.

For this month's color printer articles, however, with the help of Randy Troast of Genoa Technology—a Southern California company specializing in printer and fax testing—we were able to speed up data measurement and analysis, and perform more-thorough testing. We also verified some of the assumptions we'd previously made about color printers. For the first time we were able to test device-independent color matching—a new feature of PostScript Level 2 that allows users to specify colors based on an international standard called CIE 1931 XYZ color space. Device-independent color makes it possible to input, view, and print documents with more-predictable results.

Improving Color Analysis

THE HARDWARE AND SOFTWARE SYSTEM that has changed the way we test printers' color quality is Genoa Tech-

nology's Color Performance Test. Its main element is Color Performance Analyzer (CPA), a Microsoft Windows-based application that allows color gamut data for a printer to be gathered very quickly. Color Performance Test includes a database of color gamuts for some of the more popular color printers such as the HP PaintJet XL 300, Tektronix's Phaser III PXi, and the Seiko ColorPoint PSX, as well as color gamuts for a generic monitor and an offset press (commonly used for magazine publishing). The spectrophotometer we used in conjunction with CPA was a Gretag SPM-50.



MARK COUNA

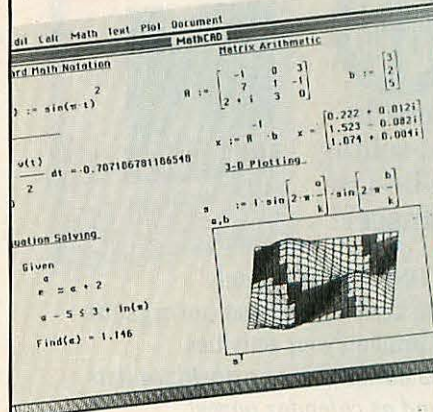
To generate output for color measurement, Genoa supplied a special PostScript file developed by the ANSI IT8.7 committee (formed to develop standards for color communications and device characterization in the graphic arts and printing industries) for downloading to the color printers.

With the output, we could use CPA to measure the color gamut in the CIE $L^*a^*b^*$ color space. Macworld Lab performed a basic 6-color gamut measurement for each printer. For the printers that were able to produce the widest range of colors, we used a 182-color gamut measurement to generate output covering the dynamic range of their color-rendering ability. This allowed us to differentiate the highest-quality color-printing performance from that of slightly lower quality.

Color Performance Test enabled us to verify one thing we suspected—color printers are unable to reproduce certain colors, especially saturated greens and blues. To test this yourself, try printing the brightest greens and blues your color application can generate, and then

continues

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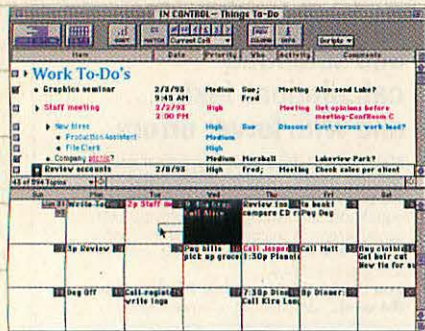
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compare the output with what you see
on screen.

We also noticed that most desktop
printers have a larger color gamut than a
single-web offset press (used to print
magazines like *Macworld*), proving that a
large color gamut alone doesn't guarantee
the best color quality. Factors such as
resolution, dot size and shape, registra-
tion, and halftoning also contribute to
a printer's ability to reproduce high-qual-
ity color.

Devising Tests for QuickDraw Printers

SINCE CPA'S TEST FILE FOR COLOR
measurement is in PostScript format only,
we had to develop a method of obtaining
at least the primary color patches (red,
green, blue; and cyan, magenta, yellow)
color patches for plotting a basic 6-color
gamut for each of the QuickDraw-based
printers. Eventually we figured out four
ways to generate the color patches. (1) We
used vendors' test prints when available—
most printers can generate all the primary
colors on a test page. (2) We used Ultra-
Paint with a Mac Classic, which doesn't
have a color ROM. (3) We used
FreeHand for printers (such as the Canon
CJ-10) that require 32-bit QuickDraw
(specifying pure red, green, and blue under
Spot Color). (4) We used ColorAge's
PostScript interpreters—Freedom of
Press Pro and Visual Business Systems'
Professional Output Manager—to down-
load the PostScript file that contains the
color gamuts.

Device-Independent Color Matching

WE ALSO USED CPA TO PERFORM A
PostScript Level 2 color-matching test.
Our objective was to see how closely Post-
Script Level 2 printers could match device-
independent color. Theoretically, if
you input a color value (such as a yellow
with a CIE L*a*b* value of 88, -9.9, 61)
that you know the printer can generate,
the printer should print a color whose
measurement is equal to or close to the
input value.

To test this theory, we measured the
values of the output from each printer's
original PostScript test file; fed those val-
ues into CPA, which generated a Post-
Script file; and printed the new file. We
then measured the values of the new out-
put and compared the old and new values.
Since the new output was based on the
measured values of the original output and
we knew the printer could produce that
color, we expected the new and the old
output to look identical. But a quick com-
parison of the two revealed big differences
on quite a few color patches. This proved

to be the case with all the PostScript Level
2 printers.

Some color deviations between print-
outs might result from temperature varia-
tions (over time) of a printer's thermal
head. We also noticed that in a few cases,
even a slight shift of the spectropho-
tometer's position within the same color
patch caused variations—especially when
using a halftone printer. And a spectro-
photometer's precision level could cause
it to place a data point outside the color
gamut. After researching the problem
with Genoa Technology and Adobe, we
determined that the mismatched colors
were mainly attributable to Adobe's
method of handling out-of-gamut colors.
Most of the variations involved colors that
were close to, or outside, the boundary of
a printer's color gamut. Adobe's method
of handling the out-of-gamut colors is to
keep the color's lightness and hue con-
stant but move the color's chroma inside
the gamut. However, that usually means
sacrificing color accuracy for more pleas-
ing colors.

Color-Rendering Dictionaries

BECAUSE WE WANTED TO MATCH
colors as precisely as possible, Adobe rec-
ommended that we use a color-rendering
dictionary called minimum Δ-E, which
would move out-of-gamut colors to the
nearest point on the boundary of the color
gamut, resulting in much closer matches.
When we used this dictionary in testing
the Tektronix Phaser II PXi, we found
that a few color patches still varied from
the original, but generally the results
were more acceptable. Printers equipped
with PostScript Level 2 have the ability
to accept multiple color-rendering dictio-
naries, but only if a given application sup-
ports that function—and so far, none do.
Being able to access multiple rendering
dictionaries would be useful, for example,
when printing a document containing a
company logo and a scanned image—
the minimum Δ-E method would pre-
serve the logo's original color, while a
color-rendering dictionary that uses the
constant lightness and hue method would
provide nicer-looking colors for the
scanned image.

So what conclusions can we draw
from our test results? There seems to be
no single method of color matching
that works successfully for all situations.
Using PostScript Level 2 device-indepen-
dent color, applications that support Post-
Script Level 2, frequently calibrating the
output and input devices, having a good
color-management system, and finally,
old-fashioned trial and error can all con-
tribute to producing the best possible
color match. **m**

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AppleTalk	YES	Yes	Yes	No
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Simultaneously Active Ports	YES	No	Yes	No
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BY DAN LITTMAN AND TOM MORAN

Apple Finally Steps into Server Market, Introduces Speedier AppleShare

After years of building network-ready desktop computers, Apple has finally entered the network server market. In a long-overdue move to fill a gap in its product line, Apple unveiled its first network servers—Macintoshes with preinstalled network operating systems designed as central repositories for, and managers of, shared data, such as files and databases.

The Apple Workgroup 60, 80, and 95 servers couple existing Macs—the Centris 610, Quadra 800, and Quadra 950, respectively—with new performance-tuned versions of AppleShare, Apple's server-based network operating system. Apple's design goal for these hardware-and-software packages was to significantly increase performance over Macs running the previous version of AppleShare, which customers had to install on their own. These preconfigured, higher-performance servers should help Apple achieve its strategic goal of competing more favorably in corporate environments.

Workgroup 95

WHILE THE APPLE Workgroup 60 and 80 repackage ex-



THE APPLE WORKGROUP 95 (LEFT), BASED ON THE QUADRA 950, BOOSTS ITS PERFORMANCE VIA A UNIX-BASED VERSION OF APPLESHARE AND A PDS ACCELERATOR BOARD. THE WORKGROUP 80 (TOP RIGHT) AND 60 (BOTTOM RIGHT) COMPLETE APPLE'S TRIO OF PRECONFIGURED NETWORK SERVERS.

isting Macs with a souped-up network operating system, the Apple Workgroup 95, based on the Quadra 950, forges new ground for Apple. The server features a Processor Direct Slot (PDS) accelerator board, 16MB to 256MB of parity memory (for higher data integrity),

higher-capacity storage, and bundled backup software. The Workgroup 95 will run AppleShare Pro, the first version of AppleShare to run on A/UX—Apple's version of Unix with a System 7 user interface.

The Workgroup 95's PDS board improves the system's

performance by using built-in 128K (upgradable to 512K) of static RAM that serves as a cache, storing the most frequently accessed data. Because the server's CPU accesses data faster from the SRAM than from system DRAM, caching shortens processing time.

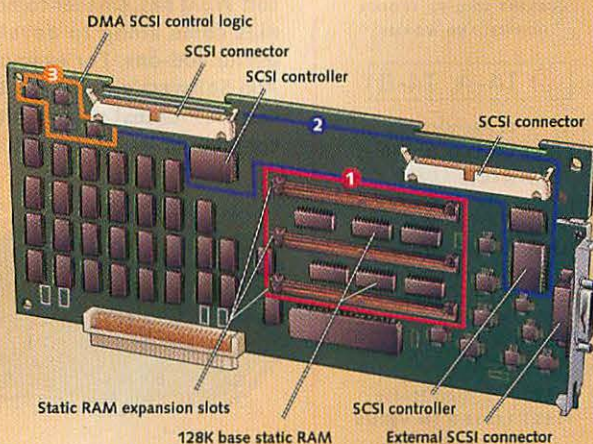
PDS Board Speeds and Expands Workgroup 95

Much of the Workgroup 95's performance comes from its PDS board, the Workgroup Server PDS Card, which Apple also offers as an upgrade for the Quadra 900 or 950. Here are its three key benefits:

1 Speeds data access The Workgroup Server PDS Card lets the server access data faster by using 128K to 512K of static RAM that serves as a secondary memory cache for a 68040 server. The cache stores the most frequently accessed data, boosting performance.

2 Supports more SCSI devices The PDS board's two SCSI controllers augment the two on the server's logic board. The Workgroup 95 can recognize 28 SCSI devices, 7 for each controller; however, physical constraints restrict it to 14 external and 6 internal devices.

3 Frees up the CPU The DMA (Direct Memory Access) SCSI control logic chip set offloads I/O processing, freeing the CPU for other tasks.



Two DMA SCSI channels on the board ease the load on the processor, freeing it for other tasks. The two DMA SCSI channels supplement the logic board's two SCSI channels; because A/UX 3.0.1 can see 7 SCSI devices per channel, the server can logically recognize 28 attached SCSI devices. Due to physical constraints, however, attaching 14 external devices and 3 to 6 internal devices is the practical limit.

Because AppleShare Pro is based on Unix, a multitasking operating system, it supports asynchronous I/O (the ability to overlap reads and writes), which lets the server perform I/O for multiple users simultaneously, speeding response times.

AppleShare Pro will boost performance to four times that of AppleShare 3.0, a speed that matches Novell NetWare 3.11 running on a comparable Intel-based platform, according to Apple's tests on a 20-node network. AppleShare Pro, which supports 200 simultaneous users, is scheduled to ship in April priced at less than \$2500.

The Workgroup 95, which includes AppleShare Pro, A/UX 3.0.1, and Retrospect Remote backup software, is scheduled to ship in April and to cost \$7000 to \$15,000, depending on configuration. The higher-end models will have higher memory capacities and multiple hard

drives. Apple will offer an internal CD ROM or tape drive, which can store 4GB to 6GB.

A/UX 3.0.1, a version optimized for this hardware, includes AppleTalk and TCP/IP protocol stacks. A/UX allows AppleShare Pro to support 5000 open files, compared with 246 files (a Macintosh Operating System limit) with other

AppleShare versions.

The Workgroup 95 clearly demonstrates Apple's desire to penetrate the higher-end server market, especially the database server market, which is growing faster than the file- and print-server markets. Apple is working with such companies as Oracle and ACI US (which makes 4D) on databases for

the Workgroup 95. In April, Oracle is scheduled to release Oracle 7 Cooperative Server for A/UX, a distributed database with a Macintosh user interface. The Workgroup 95 also addresses the need for a Macintosh file server for large workgroups (100 or more users) and for workgroups using performance-demanding or Unix applications.

Quadra 900 and 950 owners will be able to buy upgrade kits, scheduled to ship in April. One kit will include the Workgroup Server PDS Card and A/UX 3.0.1. A second kit will include the PDS board, A/UX 3.0.1, and the internal tape drive. Both will include Retrospect Remote. AppleShare Pro will be sold separately.

Workgroup 80

THE APPLE WORKGROUP 80 IS positioned in two ways: as a file-and-print server for midsize workgroups (30 to 40 users of general-business applications), and as a communications platform for software applications such as a router; an SNA, X.25, or X.400 gateway; or an Apple-

continues

Apple's Powerful Text Retrieval

A new text-retrieval technology from Apple will make it easier for users to locate information based on keywords contained in a file. AppleSearch information-access software technology, which is scheduled to ship this summer, will let networked Macintosh users query text-based information located on servers. For example, users at a software development firm or a canned-fruit company might ask the software for a weekly report of any news-feed items with the word *apple* in them.

The text-retrieval technology consists of separate software on the server and on a user's machine. Users define the parameters—such as keywords and time period—of search queries and define which folders to search on the server. Because the server processes the queries, searches can take place even when a user's machine is turned off. To determine which users can access which folders, the server software uses AppleShare file services (or System 7 file-sharing, although Apple doesn't recommend this approach because it supports fewer users and it's more difficult to manage).

The server software finds the data that fits the search criteria, rates its relevancy (based on the num-

ber of matches to search criteria) using a five-star system, and sends the names of the files that contain the data back to the user's Macintosh. A user can view a list of files or a newspaper-style report with the first paragraphs of the file; look at the text in the files (even if the user's machine doesn't have the application on it); and copy the files from the server.

The server can index data, manually or automatically, at the word level. Every time the server indexes the folders, it re-executes those queries that include a request to search new information.

The text-retrieval software supports AppleTalk Remote Access, allowing PowerBook users to connect to the server to execute queries or to a client Macintosh to download finished reports.

The server software requires a 68040-based Macintosh server, such as the Apple Workgroup 60, 80, or 95. The client software runs on any Mac running System 7.0 or higher. Apple expects to offer in the summer a client software developers' kit with a programming interface and software for customizing "newspaper" report formats. Pricing was not set at press time for any of the AppleSearch software.

—ELIZABETH DOUGHERTY

Talk Remote Access server. For example, later this year Apple plans to introduce multiline AppleTalk Remote Access server software. The software will also run on the other new server platforms and compete against dedicated hardware remote access servers. Apple's planned AppleTalk Remote Access server, which will also support X.25, will allow remote users to access a network through a server, rather than through a desktop as with AppleTalk Remote Access 1.0.

The Workgroup 80 is a Quadra 800 bundled with AppleShare 4.0, System 7.1, and 8MB to 136MB of interleaved memory; it is expected to ship in June and to cost between \$6500 and \$10,500, depending on configuration.

AppleShare 4.0, for 68040 Macintoshes such as the Workgroup 60 and 80, will perform twice as fast as AppleShare 3.0, according to Apple. (Apple will continue to sell AppleShare 3.0 because it runs on all Mac platforms currently sold.) AppleShare 4.0, scheduled to ship in June, will support up to 150 simultaneous users and will cost less than \$2000 as a stand-alone software product.

The network operating systems will support services beyond file and printer sharing. Apple will provide some services (such as information access; see "Apple's Powerful Text Retrieval") through applications, and other services (such as messaging, directory services, and user authentication) through the Apple Open Collaboration Environment, which will run on a dedicated server.

Workgroup 60

THE APPLE WORKGROUP 60, AN entry-level file-and-print server, is targeted at small workgroups (15 to 20 users of general-business applications). The Workgroup 60 consists of a Centris 610 bundled with AppleShare 4.0, System 7.1, and 8MB to 68MB of DRAM. Scheduled to ship in June, the Apple Workgroup 60 will be priced between \$3000 and \$5000, depending on configuration.—ELIZABETH DOUGHERTY



VIRUS WATCH

CURRENT VIRUSES, TROJAN HORSES, AND WORMS

T4-A, T4-B

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 10/92
INFO: Initially discovered in a game called GoMoku
IMPACT: Both versions of T4 damage system files and applications

ChinaTalk

TYPE: Trojan Horse
FIRST LISTED IN VIRUS WATCH: 10/92
INFO: ChinaTalk is an INIT that comes with a read-me file that claims it provides a female voice for MacinTalk
IMPACT: Deletes the contents of disk drive on restart

CPPro

TYPE: Trojan Horse
FIRST LISTED IN VIRUS WATCH: 5/93
INFO: Claims to be a new version of Compactor Pro, but when launched it attempts to reformat mounted hard drives and floppies
IMPACT: Can delete data. May be more likely to affect floppy disks than hard drives

ClarisWorks' Upgrade Packed with Features

Claris is adding a hefty set of new features to its all-in-one small-business package, ClarisWorks. Version 2.0's most obvious new pieces are an outliner for simple click-and-drag reorganizing of documents, a paint environment, a slide-show feature, and button palettes for one-click access to many common commands and user-defined macros.

Version 2.0's word processor can wrap text around graphics and can create character styles, though it does not

Software Add-On Searches Word

When a product has the enormous installed base that Microsoft Word has, smaller companies come along to develop useful add-ons. For example, Alki Software's new Seek DA searches for text strings in the contents of Word, MacWrite,



and text files (it also searches dates, file names, Word's summary info, and so on). Seek DA

News

has an almost endless set of search tools including Booleans and a relatively unimposing form of GREP, a powerful pattern-matching system. Search criteria can be saved and reused.

Alki has previously released other Word add-ons, including the \$99.95 MasterWord (see "New Add-Ons for Microsoft Word," *Macworld News*, December 1992). Seek is \$39.95. Alki also publishes English and foreign-language dictionaries and thesauruses. Alki, 206/286-2600.—D.L.

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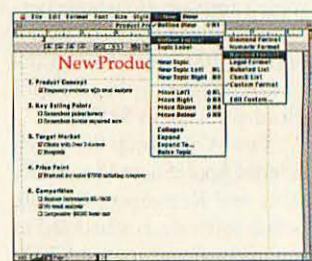
Technology for sharing computer documents across applications and platforms is a vision—or an obsession—that lures programmers to their keyboards just as gold lured men to the Sierra Madre. The company that hits this mother lode will gain control of a platform as fundamental to computing as Microsoft's DOS or Adobe's PostScript.

Pickax wielders include Adobe, with its still-under-development Acrobat, which saves a PostScript image of a file to disk, navigates the image file with a viewer, and uses Multiple Master fonts to compensate for missing fonts; Frame Technology, with a FrameMaker hypertext viewer; and Northern Telecom and Interleaf, which both have products in the same vein.

Most recent to stake a claim is No Hands Software with its Digital Paper technology, the basis for Common Ground. Common Ground creates images that are, pixel-for-pixel, identical to the original file; incorporates the original font shapes in the file; has password-protection and encryption; can search text; and can compress a full page of text to 7K. Common Ground is \$189. Future Digital Paper-based products will do routing, have multiple layers for annotation and stick-on notes, and provide tools for creating hypertext books. No Hands Software, 415/321-7340.—D.L.

support Word-like paragraph styles. The charting module has been expanded with Hi-Lo charts, pictograms, combination charts, and improved labeling and formatting options. The database adds automatic data entry for serial numbers and similar uses; pop-up lists; and data validation.

ClarisWorks' list price remains \$299, and Claris says it still runs in 600K of memory. Claris, 408-727-8227.—D.L.



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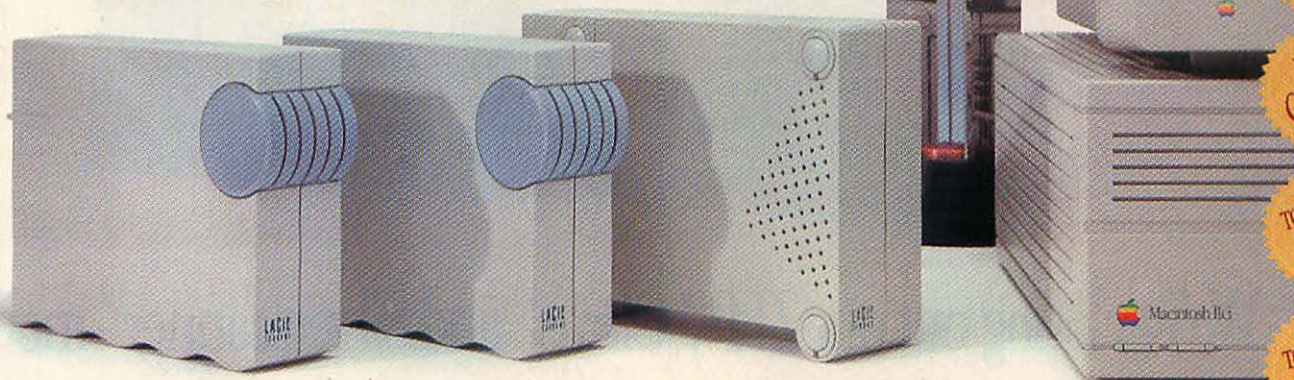
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Continuing our award winning tradition of providing outstanding scanning solutions for the Macintosh, La Cie proudly announces Silverscanner II. It is so good, we used it to produce this page. Gorgeous color. Fine image detail. Excellent tonal range. The proof is right in front of you.

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Circle 246 on reader service card



CREATING SPECIAL EFFECTS WITH AFTER EFFECTS BY LAYERING PICT IMAGES, QUICKTIME MOVIES, AND ANIMATIONS.

Special Effects for QuickTime

The Company of Science & Art (CoSA) recently released After Effects, a program for adding special effects to QuickTime movies. After Effects lets users layer multiple QuickTime movies, applying filters (sharpen, blur, emboss), motion (spin, rotate), color manipulation (color balance, tint), and masks.

CoSA's \$1295 program offers many of the same effects as VideoFusion's \$649 VideoFusion but adds special features for output to video. After Effects includes a titling module, audio fade, frame sizes up to 4000 by 4000 pixels, background rendering, animatics, adjustments for broadcast color, and field rendering for interlaced video (field rendering compensates for the time lag when a device such as a TV draws odd and even lines for each frame). CoSA, 401/831-2672.—ERFERT FENTON

Industrial-Strength Graphics Database

Clip art publisher Multi-Ad Services is preparing version 2.0 of Search, its industrial-strength system for storing and distributing digital images.

Multi-Ad says a Search 2.0 catalog (an image database) can handle 150,000 images easily and can go to a half-million. The company says catalog size maxes out at 4GB, and Search can open ten catalogs at once. It supports most file formats, including QuickTime movies, and can catalog art onto, and retrieve it from,



Ad's own Creator.

The first version of Search was recently acquired by Aldus, updated, and republished as Fetch; but Search 2.0 is grown from different root stock. Search is \$249. Multi-Ad Services, 309/692-1530.—D.L.

More TV on the Mac

Workstation Technologies has tuned in to Macintosh television by designing WTI PrimeTime, a TV tuner that brings VHF, UHF, and cable broadcasts to the computer screen. The self-contained tuner receives television signals and sends them to video-digitizing boards such as SuperMac's VideoSpigot. The tuner is controlled through the Apple Desktop Bus and comes with a software package that allows users to change channels using mouse commands. The tuner won't be available to users directly from Workstation Technologies, but will be available from other Mac peripheral sellers, probably by the spring of 1993, and will probably list for less than \$400. A spokesperson for the manufacturer predicts that the tuner will come in handy as consumer electronics products converge with computer systems, so that for video and computing, people will be able to buy interchangeable components the way they do for home stereo systems. Workstation Technologies, 714/250-8983.

—JONATHAN CASSELL

News

Make Your Own CD ROMs

Pinnacle Micro has introduced the RCD-202, a recordable CD ROM drive designed to let typical users make their own master CD ROMs inexpensively. It supports the ISO 9660 and HFS standards, standard OS data files, incremental and multi-session recording, audio files, and mixed data types. The drive comes with complete software for creating the CD ROMs. The drive can also make small production runs of CD ROM discs, since the discs are readable by standard CD ROM drives. The Macintosh version lists for \$3995 and began shipping in February. Pinnacle, 714/727-3300.—T.M.



PINNACLE'S RCD-202 RECORDABLE CD ROM DRIVE CAN CREATE CD ROM DISCS ON YOUR DESKTOP.

Sharp Ships Dye-Sub Printer

Sharp Electronics is shipping its JK-7000 dye-sublimation printer, which produces a four-color letter-size page in about four minutes, according to the company. The \$7500 300-dpi printer also handles legal-size pages and transparencies. It comes with a SCSI-2 interface and 8MB of RAM but can accommodate up to 32MB. Sharp, 201/529-9593.

—NANCY E. DUNN



BUG REPORT

PageMaker and System 7 Archivers beware: You will not be able to reopen PageMaker 4.2 files that subscribe to text or graphics files if PageMaker can't find the external files. Aldus says the workaround is to open them under System 6.

MacInTax 1992 Large imported files can overflow MacInTax's normal memory partition. Workaround: increase MacInTax's memory partition.

Using the fonts bundled with MacInTax can change completed tax forms to print with incorrect fonts. ChipSoft says an upgraded font suitcase is available on request.

Microsoft Word 5.1 Files duplicated with the Save As command do not have the headers or footers of the original files. Microsoft says this bug is fixed in the currently shipping version of 5.1, and a patch is available free on request to registered owners of the early version of 5.1.

Microsoft PowerPoint 3.0 Crashes on PowerBook 160s, 180s, and Duos. A patch is available on request to registered users at no charge.

System 7.1 and Mode32 Using virtual memory under 7.1 with Connectix's Mode32 installed causes a crash. Apple is working on a patch to be called 32-bit Enabler Extension. The distribution policy was not set at press time.

MACWORLD WILL SEND YOU A BUG REPORT T-SHIRT IF YOU ARE THE FIRST PERSON TO INFORM US OF A SERIOUS, REPRODUCIBLE BUG THAT WE REPORT IN THIS COLUMN. SEE HOW TO CONTACT MACWORLD.

Looks like Mac users just got their very own HP LaserJet.



The new generation HP LaserJet 4M printer.

At last. An HP laser printer built specifically for the Mac—the new LaserJet 4M. A laser printer with everything Mac users need. From built-in PostScript™ Level 2 software from Adobe™ to standard LocalTalk and optional EtherTalk.

The finest print quality in its class.

Thanks to HP's microfine

toner, Resolution Enhancement technology, and advanced engine designed expressly for 600 x 600 dpi, the LaserJet 4M printer delivers the finest print quality of any 600 dpi machine available.

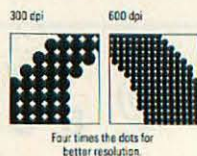
And with a new RISC processor and 6 MB of standard memory accelerating formatting and I/O speeds, complex

PostScript and graphics files are rendered faster and more clearly than ever before.

Greater flexibility.

The HP LaserJet 4M printer also sets new standards in versatility, with a wide range of typefaces and two integrated paper trays. As well as the

options of a 500-sheet tray and power envelope feeder.



And it's designed to be shared simultaneously by PCs and Macs. Automatic language switching between PCL 5 and PostScript, and 3 hot I/Os give mixed environments greater flexibility. Without compromise to either.

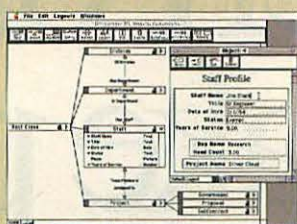
Of course, with the HP LaserJet 4M printer, you'll enjoy HP's renowned quality and reliability. All for only \$2,399.* So call 1-800-LASER-JET (1-800-527-3753) Ext. 7340** for print sample† and comparison disk. Or visit your nearest authorized HP dealer.



Object-Oriented Databases Arrive

Relational databases store information in many tables. Reassembling the information generally requires knowledge of a query language such as SQL. A new and fundamentally different technology, object-oriented database management, organizes data into structures (called objects and classes) that understand how records differ and how their attributes differ, automatically creating relationships between types of information when relationships between classes are defined.

Previous attempts at object-oriented database systems assumed a knowledge of C++ or LISP. Mainstay's newly announced object-oriented Phyla will be nonprogrammable, with a graphical environment for designing databases, defining classes, creating forms and reports, and querying the database. Phyla promises the power of a relational database such as 4th Dimension and the ease-of-use of a flat-filer such as FileMaker. Mainstay expects to ship Phyla in mid-1993. Price was not set at press time. Mainstay, 818/991-6540.—DANIEL W. RASMUS



DRAWING A FEW LINES IN PHYLA TO SET UP LINKS BETWEEN PEOPLE, DEPARTMENTS, AND PROJECTS.

Alien Computer Invades Mac

Orange Micro has come out with three improved 386- and 486-based boards designed to run DOS and Windows with VGA graphics on Macintoshes with NuBus. Because the OrangePCs are essentially a separate DOS system board inside the Mac, users can run DOS or Windows applications at the same time as Mac applications. The products are intended for environments where running DOS applications is a requirement.

The low-end OrangePC board lists for \$1099 and includes a 386SX microprocessor. The midrange board, which lists for \$1499, adds a compatible PC-AT bus slot, a serial port, a parallel port, and 2MB of RAM expandable to 16MB. The high-end board retains those features but adds a 25MHz 486 SLC microprocessor. It lists for \$1799. All three boards are currently shipping with DOS included. The VGA graphics can be full-screen or limited to a window on the Mac, according to the company. Orange Micro, 714/779-2772.—T.M.

Speedier CD ROM Drives

Both Peripheral Land Inc. (PLI) and Procom Technology have introduced versatile dual-speed, multisession CD ROM drives with fast 200ms average access times and maximum data-transfer rates of 330K per second. Based on the same Toshiba mechanism, both the PLI CD ROM MS 200 and the Procom macCD/MX also support Kodak's Photo CD format and have 256K of cache RAM, a SCSI-2 interface, and a door that keeps dust out of the drive's slot. The Procom macCD/MX lists for



PERIPHERAL LAND'S CD ROM MS 200 (TOP) AND PROCOM'S MACCD/MX OFFER 200MS ACCESS TIMES.

TOM GIBSON

Apple Spin-Off Develops Object-Oriented Platform

Mainstay's Phyla isn't the only object-oriented data manager headed for the Mac (see "Object-Oriented Databases Arrive," left). Apple spin-off Rae Technology is creating a development platform with a built-in assistant that appears at opportune moments to perform mundane tasks.

Rae Tech (Rae was the assistant's early nickname) will release an application based on its technology, and will later release a tool kit for developers. The first application combines datebook and address book features, using a notebook binder metaphor with sections for people, companies, events, and so on. Its object-oriented nature adds unusual strengths—for example, if you add a person to the address book, the assistant offers to make a new company record for that person's company. The system provides many such self-incarnating links and smart tunneling between information. Rae Tech expects third-party developers to apply the tool kit to everything from serious databases to executive information systems to hypertext books. Pricing was not set at press time. Rae Technology, 408/725-2850.—D.L.



TURKEY SHOOT

DESIGN FLAWS NOTED

At Ease Apple's childproof Finder replacement will keep your kids from opening your files from the Finder—but if the kids can open the creating applications, the files are wide open.

Microsoft Excel 4.0 Excel is picky about numbers in worksheet cells that are too narrow and, depending on how cells are formatted, converts numbers to scientific notation or displays them as #####. So far no problem. Problem: If you export your worksheet as a text file, your numbers come out in scientific notation or just plain #####.

MacInTax 1992 Form 8271, for reporting tax-shelter registration numbers, has disappeared from MacInTax this year. Unfortunately, the IRS is still around to collect a \$250 fine for each unreported number.

If you don't itemize, the Interview mode doesn't ask for estimated state tax payments, allowing you to help pay off the federal deficit, because state tax prepayments won't be subtracted from adjusted income on federal forms.

Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See *How to Contact Macworld*.

\$795 including stereo headphones, and is available now. Procom is also offering the macCD Station II, a \$995 bundle of the macCD/MX drive with seven popular CD ROM titles and amplified external speakers. The PLI CD ROM MS 200 lists for \$928 and is shipping now.

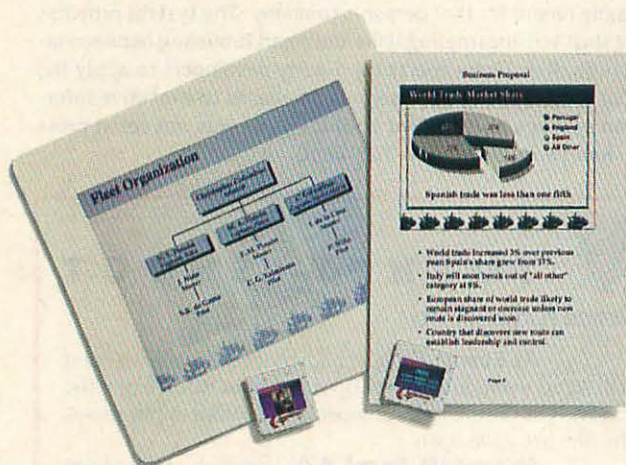
Procom has introduced the macCD Player, a CD ROM drive that has a slow 650ms average

access time and lists for only \$399. Although it supports Photo CD, the macCD Player is a single-session drive, which means that photos can only be recorded on it one time. Multisession drives have hardware that allows for adding more images long after the first photos are recorded on a disc. Procom, 714/852-1000; PLI, 510/657-2211.—T.M.

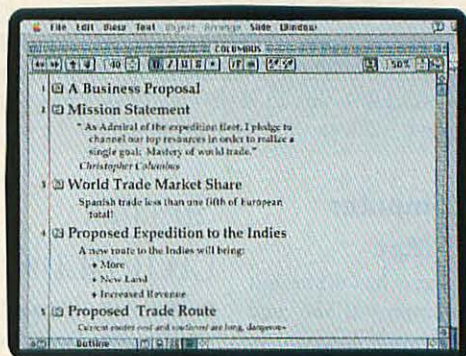
New PowerPoint 3.0. tools make power



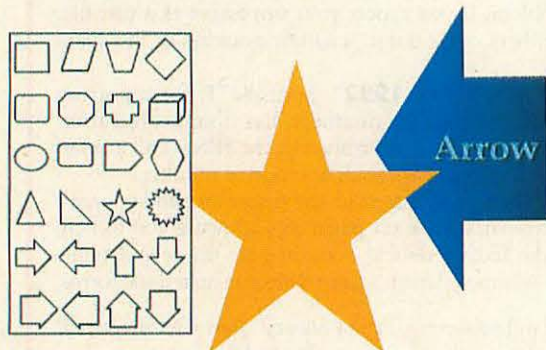
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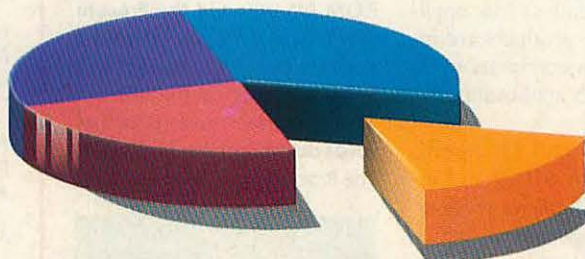
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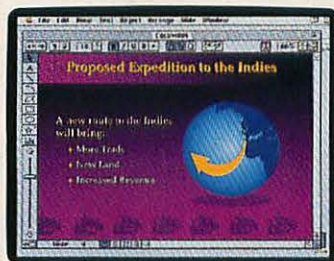
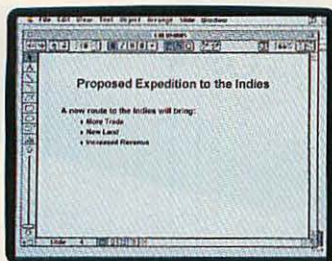
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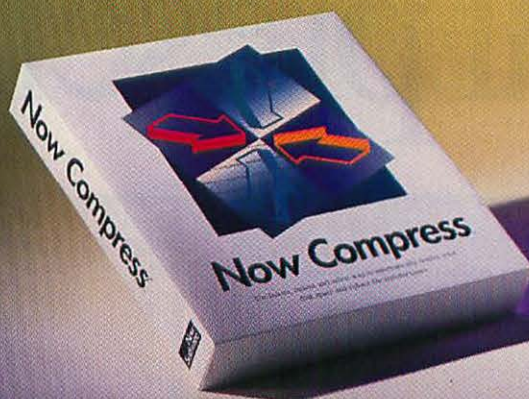
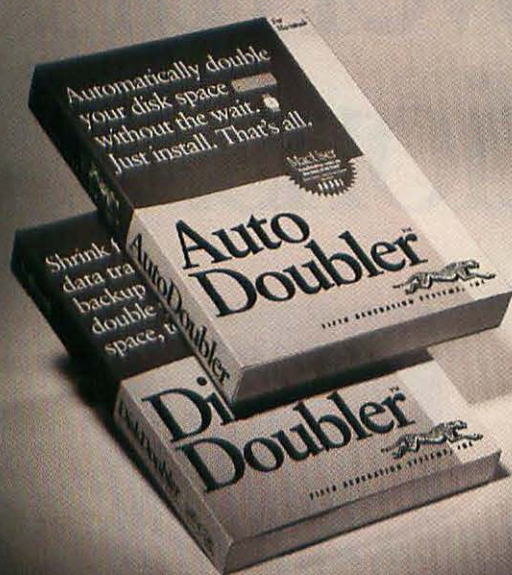
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required: title page of user's manual or Disk 1 of the program. Reseller prices may vary. Plus applicable sales tax and freight if ordering directly from Microsoft. Offer good only in the 50 United States (800) 563-9048; outside the United States and Canada, call (206) 936-8661. Microsoft and PowerPoint are registered trademarks and Windows is a trademark of the Microsoft Corporation. Macintosh Presents are registered trademarks of Cricket Software. Symantec MORE is a trademark of Symantec Corp. Installation of PowerPoint version 3.0 for the Macintosh requires System 7 to run.



LOOK, IT'S COMPRESSING EVEN BEFORE IT'S OUT OF THE BOX.

Ever wonder why you had to buy one compression program to automatically free up disk space and another to let you shrink files on demand? Ever suspect it was because somebody wanted to bill you twice?

How cynical of you.

Fortunately, Now Compress combines both functions in one rather amazing package. It can double the size of your hard drive by compressing your data smaller than AutoDoubler™, DiskDoubler™ or any other product. Additionally, it creates tiny archives that drastically reduce the time it takes to transfer files throughout a network.

What's more, it decompresses so quickly you won't notice when you're working with compressed data.

In the Now Software tradition, we've humanized the interface to make it far simpler to use than other

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Note the Inspector window on the left. It lets you see the status of any file, folder or

File Name	Original	Compressed	Size	Status	Creator	Type	Label	Last Modified
1990 Year-end Report	10.3K	5.8K	42%	Compressed: Faster	HEVB	VGBM	None	Fri, Jan 29, 1993
Small New York Files	62.5K	19.5K	69%	Compressed: Faster	BC80	CVSS	None	Thu, Feb 25, 1993
Mailhead.asp	48.5K	9.4K	78%	Compressed: Faster	F4A3	EPDF	None	Thu, Aug 27, 1992
Newsletter/Jan 93	100.2K	25.4K	75%	Compressed: Smaller	ALD4	ALB4	None	Fri, Sep 11, 1992
Product Descriptions.asp	254.7K	---	---	Archived	NC44	APPL	None	Thu, Feb 25, 1993
Q1'93 Objectives	6.5K	---	---	Don't Compress: Item	H5VD	VGBM	None	Mon, Feb 1, 1993
Team Photo.TIF	235.3K	36.4K	84%	Compressed: Faster	TFF	TFF	None	Fri, Jan 15, 1993
Compressed: 5 of 7	712.9K	378.6K	53%					

disk, and perform any compression operation with a click of your mouse. Now Compress. It's the fastest, safest, most useful compression package you can get.

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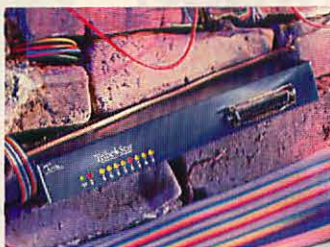
**Now
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Linking LocalTalk to Ethernet

If you need to plug LocalTalk-using workgroups into an Ethernet backbone, Tribe Computer Works' new hub, the TribeStar, may provide better throughput than a standard router for about the same cost per user.

Like Tribe's LocalTalk-only LocalSwitch, the TribeStar is built for speed: with eight LocalTalk ports, it deploys four processors, each of which is able to open two connections simultaneously. The net result is that every port has access to the Ethernet network at LocalTalk's 230 Kbps top speed.

The TribeStar connects to thin-net, thick-net, or 10BaseT and ships with SwitchMonitor management software (Tribe plans to support SNMP when Apple makes that possible). With Ethernet boards for individual Macs now running about \$200, the \$1795 TribeStar becomes economical only when more than one Mac is daisy-chained to each port. Tribe, 510/547-7800.—D.L.



WITH A PORT FOR EVERY LOCAL-TALK USER, THE TRIBESTAR SPEEDS UP ACCESS TO THE ETHER-NET BACKBONE.

SCOTT PETERSON

RAGE Speeds Applications

Envisio has announced RAGE (Radically Accelerated Graphics Engine), a 24-bit video-display board that accelerates general video display and the graphics-processing of applications such as Photoshop. Similar to DSP (digital signal processor) acceleration boards like SuperMac's ThunderStorm and Spectral Innovations' Lightning Effects, RAGE makes an application run faster by replacing or augmenting parts of the software—usually filters. The basic board accelerates QuickDraw; application-specific acceleration will be sold in modules for a variety of programs. Initially, only a Photoshop module will be available.

Unlike DSP boards, RAGE uses a 25MHz RISC microprocessor, which makes RAGE programmable so it can handle a wide range of products and features. RAGE supports monitors as large as 21 inches and provides on-the-fly resolution switching for multisyncing monitors. The introductory price is \$1995, including the acceleration module for Photoshop, which will be optional later. Envisio, 612/628-6288.

—GALEN GRUMAN

News

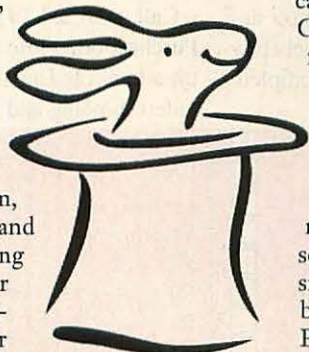
Graphics Board Adds Ethernet

Lapis Technologies has introduced a line of boards that combine Ethernet and video interfaces. The four DisplayNet boards support Lapis's Full-Page Display and Two-Page Display monitors in 1-bit mode. The DisplayNet II, designed for NuBus Macintoshes, supports both 10BaseT twisted-pair and 10Base2 thin-net Ethernet. The DisplayNet PDS/30, designed to plug into the Processor Direct Slot on the Macintosh SE/30 and IIsi, can also interface to both 10BaseT and 10Base2 Ethernet networks. The DisplayNet LC-10BaseT board supports 10BaseT, while the DisplayNet LC-ThinNet supports 10Base2, both for the Macintosh LC family. All the boards are available now at a list price of \$549. Lapis Technology, 510/748-1600.

—JONATHAN CASSELL

Do You Believe in (General) Magic?

For over two years now, suspense has been building over the activities of a small communications start-up in Mountain View, California, called General Magic. The company's cofounders include key members of the original Macintosh design team, Andy Hertzfeld and Bill Atkinson, along with several other talents who had formerly worked for Apple. On February



services all provided by General Magic's partners. The first technology, conceived by Atkinson and Hertzfeld, is called Magic Cap, an interface designed to seamlessly and efficiently allow users to control communications. The second, designed largely by Xerox PARC veteran Jim White, is

8, in a posh press gathering in New York City, General Magic went public with some of its plans and revealed its strategic partners, all of whom are stockholders. Previously, only the participation of Apple—which owned 10 percent of the young company—had been announced. Now it has been confirmed that the magic is also owned in part by industry giants Sony, Motorola, AT&T, Matsushita, and Philips.

What's General Magic got that these big companies want so much? Two ground-breaking technologies, either or both of which will be integrated into hardware devices, enhanced with application software, or supported by communications

Telescript, a programming language for wired and wireless communications that can run on different hardware platforms. General Magic hopes that the language will be widely used as an easy, yet powerfully flexible means for small devices to communicate with the digital world at large—on everything from phones and faxes to other computers.

General Magic's partners didn't demonstrate their hardware devices because they are still under development. But Apple said it will implement General Magic technologies for the Mac OS, PowerBooks, Newtons, and online services. When? No date given. The wait continues.—STEVEN LEVY

DESKTOP LIBRARIAN

Books on Desktop Publishing

This month we study two volumes on the ever-popular topic of DTP.

• *Desktop Publisher's Idea Book*, by Chuck Green (1993, \$21.95). This book starts with one chapter on production basics and another on adding professional touches, then the rest of the book leads the reader through an amazing variety of practical projects step-by-step. Suggests typefaces and design for binders, books, brochures, cards, tickets, letters of all kinds, envelopes, fliers, forms, and on and on. Advice is not specific to the Mac. Intended for novices to intermediate DTPers. No glossary or index. Bantam Computer Books, 212/492-9479.

• *The Desktop Design Workbook*, by Don Busché and Bernice T. Glenn (1992, \$29.67). Intended to teach good page design, this book includes lots of discussion of principles of publishing followed by lots of exercises. Covers the publishing process from planning and budgeting to working with commercial printers. Advice is not specific to the Mac. Includes a form for ordering a \$10 disk containing files required to complete the worksheets in the text. Regents/Prentice Hall, 515/284-6751.—T.M.



ROSEMARY WILTON

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How to Master Macintosh Programs Without Reading The Manuals!

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Most people are amazed. They need training. They hate reading manuals and they don't want to pay huge sums for local Macintosh training. At first they feel like giving up in frustration. Then someone tells them about MacAcademy's unique and valuable Video Training Library.

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MacAcademy is the winner of the 1992 **MACWORLD World Class Award**. Readers chose MacAcademy as the top trainer in the nation. No other organization even came close! When it comes to training, MacAcademy has the best reputation in the business. You deserve World Class training at an extremely low price. In addition, all videos carry a complete 30 day guarantee.



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Accountant, Inc. Video #2
ACIUS 4th Dimension Video #1
ACIUS 4th Dimension Video #2
ACIUS 4th Dimension Video #3
ACIUS 4th Dimension Video #4
Adobe Illustrator 3.2 Video #1
Adobe Illustrator 3.2 Video #2
Adobe Illustrator 3.2 Video #3
Adobe Photoshop Video #1
Adobe Photoshop Video #2
Adobe Photoshop Video #3
Adobe Photoshop Video #4
Aldus Freehand Video #1
Aldus Freehand Video #2
Aldus Freehand Video #3
Aldus Freehand Video #4
Aldus PageMaker Video #1
Aldus PageMaker Video #2
Aldus PageMaker Video #3
Aldus PageMaker Video #4
Aldus Persuasion Video #1
Aldus Persuasion Video #2
Aldus SuperPaint Video #1
Aldus SuperPaint Video #2

Aldus SuperPaint Video #3
Claris FileMaker Pro Video #1
Claris FileMaker Pro Video #2
Claris FileMaker Pro Video #3
Claris FileMaker Pro Video #4
Claris MacDraw Pro Video #1
Claris MacDraw Pro Video #2
Claris MacProject Pro Video #1
Claris MacProject Pro Video #2
Claris MacProject Pro Video #3
Claris MacWrite II Video #1
Claris MacWrite II Video #2
ClarisWorks Video #1
ClarisWorks Video #2
ClarisWorks Video #3
ClarisWorks Video #4
Deneba Canvas Video #1
Deneba Canvas Video #2
Deneba Canvas Video #3
Design & Layout
Claris HyperCard Video #1
Claris HyperCard Video #2
Claris HyperCard Video #3
Intuit Quicken Video #1
Intuit Quicken Video #2

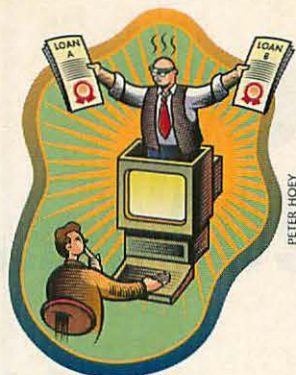
Videos can be updated upon release of new software versions for only \$14.95 each.

Lotus 1-2-3 Video #1
Lotus 1-2-3 Video #2
Lotus 1-2-3 Video #3
Macintosh (6.0 or 7.0) Video #1
Macintosh (6.0 or 7.0) Video #2
Macintosh (6.0 or 7.0) Video #3
Microsoft Excel Video #1
Microsoft Excel Video #2
Microsoft Excel Video #3
Microsoft Excel Video #4
Microsoft Excel Video #5
Microsoft Word Video #1
Microsoft Word Video #2
Microsoft Word Video #3
Microsoft Word Video #4
Microsoft Works Video #1
Microsoft Works Video #2
Microsoft Works Video #3
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Understanding Borrowed Money

You can waste many, many hours building spreadsheet models to calculate monthly loan payments, total up interest over the life of a loan, or compare interest rates—and your models won't help you with balloon payments, prepayments, and other real-world finance wrinkles. Softflair publishes Compare-A-Loan 4.0 and the new Compare-A-Loan Professional for such analyses.

To Compare-A-Loan 4.0's capabilities (see *Reviews, Macworld*, April 1993), Pro adds support for the Rule of 78s, U.S. Rule, planned extra payments, and other sophisticated tools. Pro can save complete reports as separate files and has improved printing options.

Compare-A-Loan 4.0 costs \$79.95; Pro will list for \$129. Softflair, 612/894-3357.—D.L.

ScanOffice Bundles Scanner and Apps

UMAX Technologies is offering a complete business-office scanning solution that integrates hardware with a suite of popular Macintosh applications. ScanOffice for the Macintosh features complete versions of Timeworks' Publish It Easy 3.0 desktop publishing application, Ofoto One Step Scanning Software from Light Source Computer Images, and ExpertVision's TypeReader 1.0 optical character recognition software. The system also includes UMAX's OA-1 gray-scale image scanner, a 1200-by-1200-dpi resolution flatbed scanner. ScanOffice for the Macintosh is available now at a list price of \$999. UMAX Technologies, 408/982-0771.

—JONATHAN CASSELL

Full-Time Fax Forwarding

Vomax from Macronix is a new kind of telephone-answering device that accepts and forwards voice messages and faxes over a single phone line while you access the device from afar using a touch-tone phone or fax modem. The Vomax can also optionally display faxes on a television screen, so you don't need to print them out. The Vomax, which stays in your home or office, can be set to call your pager so you know when you've received a message or a fax. The Vomax also lets callers leave a voice-annotated fax. The answering device also puts a date-and-time stamp on all transactions.

The Vomax includes a fax modem that sends and receives faxes at 9600 bps and data at 2400 bps. It does not have a printer or scanner. It can connect

to a computer's serial port, but also works as a stand-alone device. It stores 20 minutes of voice messages or 40 fax pages with its standard RAM. The memory has a battery to preserve data in a power failure. Vomax lists for less than \$400 including its software with security features. Macronix, 408/453-8088.—T.M.



MACRONIX'S VOMAX DEVICE CAN STORE AND FORWARD FAXES AND VOICE MESSAGES.

RICHARD REHMEYER

Cricket Draw Modernized

In 1986, Cricket Draw's support for snazzy PostScript features took the early Mac community by storm, but Cricket later fell on hard times and was acquired by giant Computer Associates. Computer Associates' Cricket division has been slowly updating the Cricket line, and now Draw is getting a big upgrade, to be called CA-Cricket Draw III version 2.0.

The new version straddles the MacDraw/Illustrator fence. Version 2.0 has a full text editor. It can kern text and bind text to a path—even edit it without unbinding. All objects, even polygons and text, are editable Bézier curves. Tweening (better known as blending) can merge objects' shapes and colors. High-end features provide color seps and color printing controls. CA-Cricket Draw III 2.0 will list for \$249. Computer Associates, 516/342-6000.—D.L.

Nikon Hi-Res Film Scanner

The Coolscan from Nikon Electronic Imaging Products is a compact 24-bit film scanner that provides resolutions up to 2700 dpi. The Coolscan handles 35mm color or black-and-white negatives or transparencies in a single pass, averaging 100 seconds per scan. The lightweight device will come in internal (\$2195) and external (\$2495) versions and is expected to ship in March or April. Nikon, 516/547-4355.



AN ILLUSTRATION CREATED IN THE NEW CRICKET DRAW.

DOROTHY CARICO SMITH

News

Software Drives 900 Printers

GDT Softworks has introduced PowerPrint/LT, a collection of Chooser-level drivers that supports more than 900 different models of printers over AppleTalk. Users can control resolution, color, duplex printing, and paper-tray selection where the printer itself supports those choices.

The PowerPrint/LT collection supports ink-jet, dot matrix, and laser printers, including some wide-carriage and high-speed models. It also offers reduction and enlargement of images, page flipping and inversion, cover pages for separating print jobs, and printing odd and even pages only (for two-side printing on single-side printers).

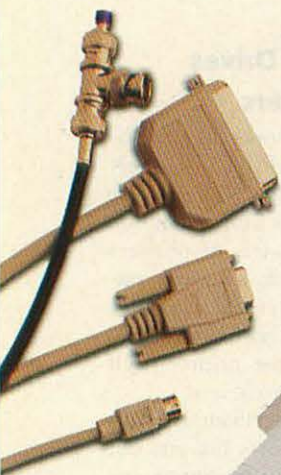
GDT began shipping the software in January at a suggested list price of \$399. The company is also working on PowerPrint/NW for Novell NetWare, which will have a list price of \$499 for 50 users, and on PowerPrint/ET for EtherTalk, which is essentially the same as PowerPrint/LT for LocalTalk but with an EtherTalk adapter. The PowerPrint/ET will probably list for \$599. PowerPrint/NW should ship in early April, and PowerPrint/ET should be available in the first half of 1993. GDT, 604/291-9121.—T.M.

JUST FOR FUN

Iron Helix CD ROM Game

Imagine a distant future where you suddenly discover that a spaceship with a lethal payload is on its way to destroy your world. That's the scenario of Iron Helix, a new CD ROM game developed by Drew Pictures and published by Spectrum HoloByte. To win the game you must maneuver your weaponless biological probe throughout six levels of the enemy ship, each with dozens of rooms, and try to disable the enemy vessel. The CD ROM title, the first from Spectrum HoloByte, provides a window with fast and smooth 3-D animation. The company expects to begin shipping Iron Helix in mid-March at a list price of \$99.95. Spectrum HoloByte, 510/522-3584.—T.M.

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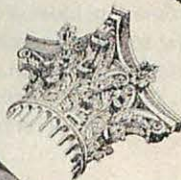


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Unity 1200XL shown with optional paper trays.

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Circle 43 on reader service card

QMS Printer Races up to 45 PPM

Designed for high-volume DTP, production, or distributed environments, the QMS 4525 Print System is a network laser printer that produces up to 45 pages per minute. The 4525 can staple, sort, print on both sides of a page, and print booklets. It includes a serial port, parallel port, and AppleTalk connection. QMS also offers two optional network interfaces: Token Ring with NetWare; or Ethernet with NetWare, TCP/IP, EtherTalk, or DECnet and TCP/IP. The printer emulates PostScript Level 1 and Level 2, HP PCL 5, HP GL, and other print control languages.

QMS also includes an internal 40MB hard drive, with another bay for a second drive, and a 1.44MB floppy disk drive. The printer has a paper capacity of 2200 pages, with options for bin sorters and a stapler/stacker. The 4525 also incorporates a high-speed RISC processor, 16MB of RAM expandable to 32MB, and the QMS Crown print-control architecture for multiprocessing and other advanced features. At press time, the list price for the QMS 4525 Print System was not set, but was expected to be about \$60,000 to \$70,000. The company scheduled first shipments of the printer for March. QMS, 205/639-4474.—T.M.

QuickTime, Animation for Presentations

Gold Disk's new Astound offers all the basics for standard business presentations—an outliner, slide sorter, templates, and so on—plus multimedia tools to spruce up your work.

With Astound, you can animate a chart on sales growth, add music to set a presentation's mood, or play a QuickTime movie illustrating your point. A run-time player for both Mac and Windows lets you distribute your desktop presentations. For the multimedia neophyte, Astound ships with lots of clip media: sound effects, high-resolution images for backgrounds, music clips, QuickTime movies, animations, and clip art. Astound imports PowerPoint and Persuasion files.

Astound lists for \$399. Gold Disk, 416/602-4000.

—JEANETTE BORZO



ASTOUND'S TIME LINE, WHERE TRANSITIONS, QUICKTIME MOVIES, AND OTHER NONSTATIC ELEMENTS ARE CONTROLLED.

Asanté Unveils Highest-Capacity Mac Hub

Aiming at the departmental Ethernet market, Asanté Technologies has announced its AsantéHub 2072 Ethernet con-



THE ASANTÉHUB 2072 ETHERNET CONCENTRATOR CAN EXPAND TO PROVIDE UP TO 72 PORTS.

centrator, which can expand to 72 ports, making it the highest-capacity hub that can be managed through a Macintosh.

The AsantéHub 2072 has seven expansion slots for adding ports and network connections. The basic model comes with 12 ports, provides a dual-segment backplane for redundancy or creating a second network, and allows the user to swap port modules without shutting down the network. The hub will have a base price of \$1095. It can connect via 10BaseT (twisted-pair), 10Base2 (thin-net), or 10BaseF (fiber-optic) Ethernet cabling. Port-expansion modules will range from \$725 for a 10BaseT module with 12 RJ-45 or RJ-21 connectors, to \$2845 for a 10BaseF module with 12 ST connections. The chassis, port

Radius Monitor

Gets Smart

The PrecisionColor Display/20i is a 20-inch color-calibrating monitor that offers more intelligence and better display characteristics than Radius's existing PrecisionColor Display/20, which it replaces. One new feature, called Dynamic Desktop, lets users change resolution and bit depth without restarting so they can open up a 24-bit image at the resolution of a 16-inch monitor, even on a larger display. Software called IntelliColor helps set the white point, vertical and horizontal convergence, brightness, keystone, pin-cushioning, and other screen characteristics using an on-screen control panel. The monitor includes a tutorial on the various software features. The display incorporates a Trinitron tube with a maximum resolution of 1360 pixels by



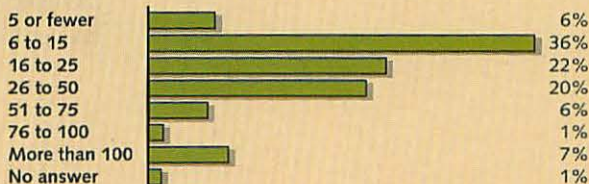
THE 20-INCH RADIUS PRECISION-COLOR DISPLAY/20I INCLUDES INTELLICOLOR CONTROL SOFTWARE.

1024 pixels. Radius expected to begin shipping the Display/20i in March at an estimated list price of \$3299.

Radius also recently announced its SoftPivot 2.0 software for the Radius Pivot line that lets the rotating monitors work with more Macs without requiring a \$599 board from Radius. The Pivots can now work with the built-in video on the Centris 610 and 650, LC III, PowerBook 160 and 180, both Duo Docks, and any Mac with 16-inch-resolution graphics on board. Radius, 408/434-1010.—T.M.

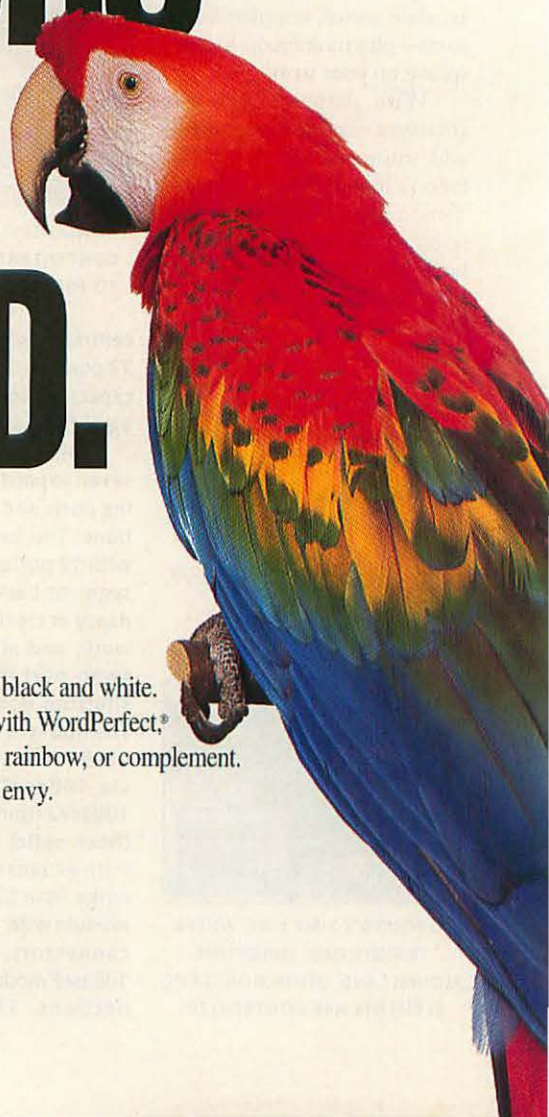
Survey: Font Mania

How many different fonts do you have installed on the Mac you use most often?

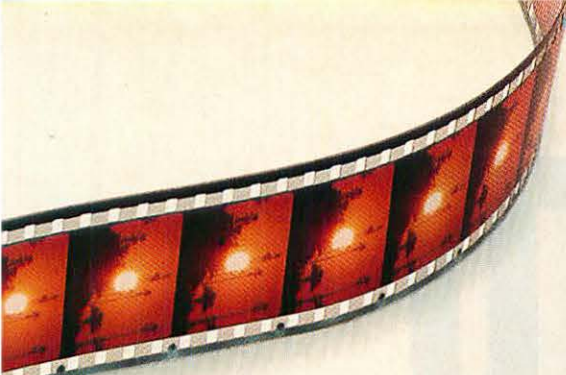


Based on 579 respondents to a 1992 Macworld reader survey who use a Macintosh. Figures do not add up to 100% due to rounding.

THE LATEST THING IN WORD PROCESSORS ISN'T THE WORD.



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PLANNED GROWTH

To Matthew Long, a Las Vegas resident, the current recession has generally muted much of this country's growth problems. In any event, it has not slowed him at all. In Las Vegas, he's building homes.



While the current recession has generally muted much of this country's growth problems, in any event, it has not slowed him at all. In Las Vegas, he's building homes.

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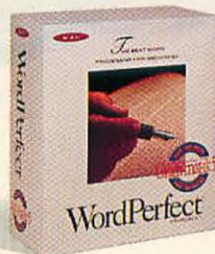


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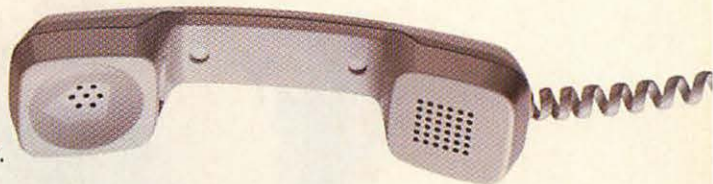
It's the compatibility. There are millions of Mac systems in the world today. But hey, there are plenty of systems like Windows, DOS, NeXT, and UNIX too. With WordPerfect, your files will be compatible with them all.



It's the system. As the first word processor to be fully System 7 savvy, WordPerfect brings you features like TrueType, Publish and Subscribe, and more. For the latest in Mac innovations, you can count on WordPerfect.

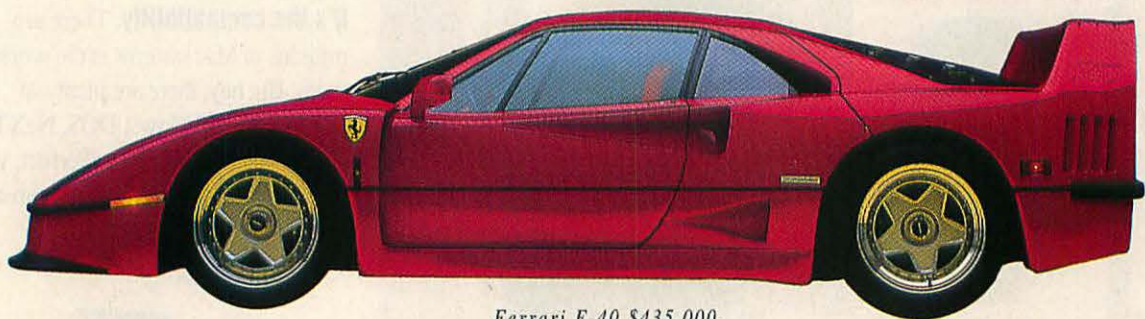
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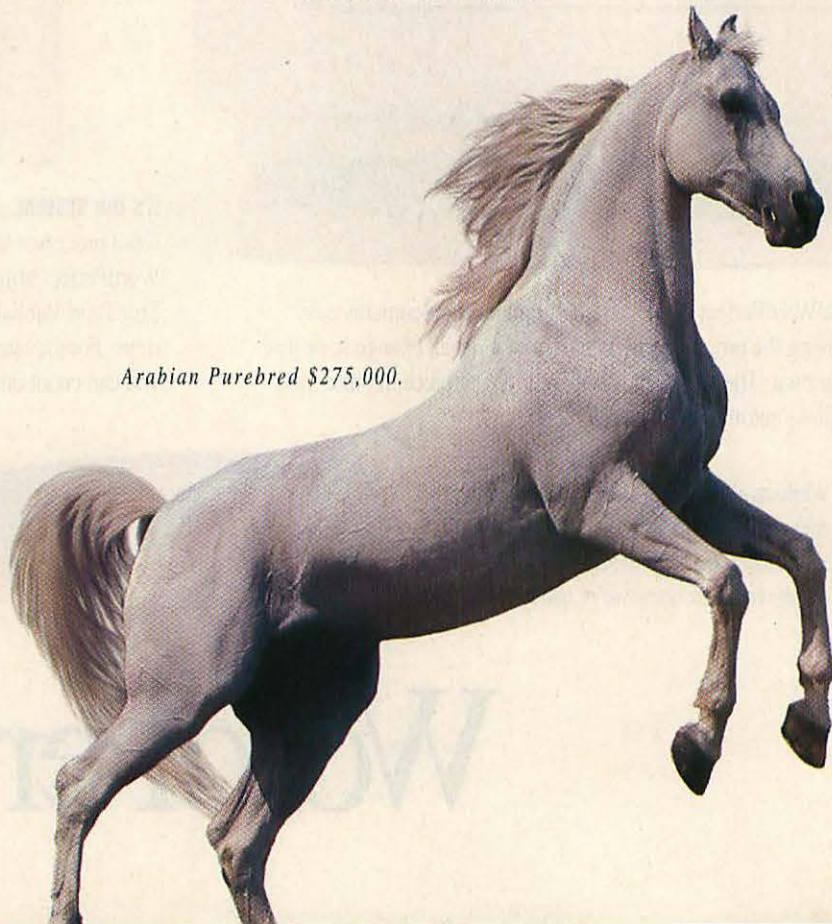


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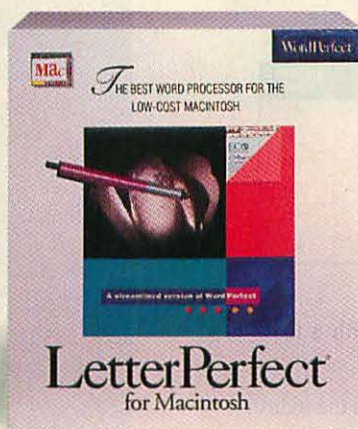


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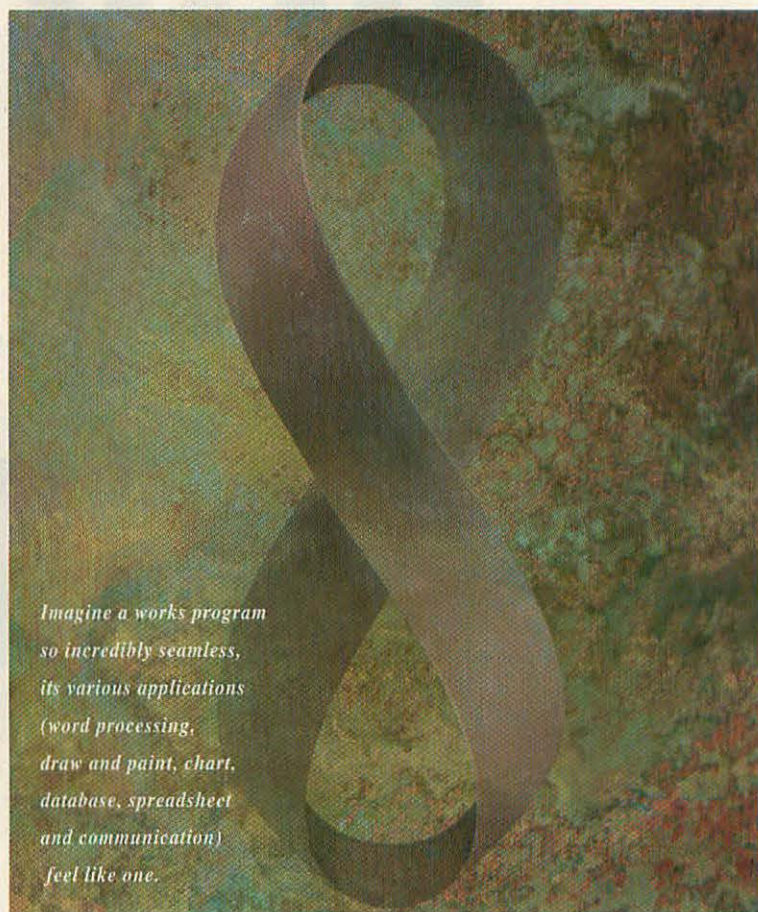
FEATURE	WORDPERFECT WORKS	CLARIS WORKS	GREAT WORKS	MICROSOFT WORKS
In-Context Editing [™] (multiple documents)	YES	NO	NO	NO
Paint and Draw	256 custom	81 draw	256	NO
Common tool bar with module-specific tools	YES	NO	NO	NO
Log-in scripts/phone book	YES	NO	NO	YES
Multiple columns can be turned on/off anywhere on the page	YES	NO	NO	NO
Auto Sum Tool	YES	NO	NO	NO

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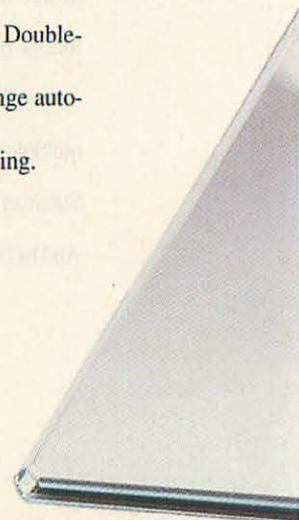
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through technology called In-

Context Editing that optimizes System 7's Publish and
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its various applications
(word processing,
draw and paint, chart,
database, spreadsheet
and communication)
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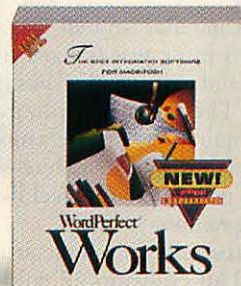
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How to Buy a Color Printer

Finding the color
printer technology that's right for you

PEOPLE RELY ON monochrome printers for day-to-day work, but more and more are buying color machines—to proof publications, create package mock-ups, print scanned or video-captured images, and produce overhead transparencies, as well as just punch up documents.

The increasing interest in color isn't all that surprising. Color printer prices have never been lower, and print quality has never been better. The complex hardware and software required to accurately mix and apply pigments continue to mature—color consumers need no longer feel like pioneers chasing rainbows.

In the following three articles, Macworld Lab evaluates 27 color printers. We've divided the contenders into the three dominant printer technologies: ink-jet, thermal-wax transfer, and dye-sublimation. These categories form a good-better-best hierarchy, and as you might expect, prices range from cheap to steep (see "Find the Right Printer for the Job").

The low end is represented by ten ink-jet printers, from the \$779 Hewlett-Packard HP DeskWriter C to the \$9995

Tektronix Phaser III PXi Color Printer. This year's ink-jets include Apple's first color printer and a machine from Canon that's also a color copier and scanner.

In the midrange sit nine thermal-wax transfer machines, which begin at \$2999 for Seiko Instruments' Personal Color-Point PSE—the lowest-priced thermal-wax transfer machine to date—and end at \$6990 for Océ Graphics' G5241-PS.

At the high end are eight dye-sublimation machines, whose prints look downright photographic. That quality goes for about \$10,000—steep, but far less than the average price reported in last April's "Color Printer Progress."

This time we didn't test stratospherically priced devices such as Iris's Smart-Jet, and we passed over color laser printers such as the Canon CLC-500 color laser copier with PostScript option. Such units are ideal for service bureaus and corporations, but the rest of us are likely to find something that does the job for a great deal less.

Grouping printers into the ink-jet, thermal-wax, and dye-sublimation categories is convenient for price and basic comparisons, but your shopping list needs to address other things, too. Here's an overview of the key issues I'll examine in the articles that follow.

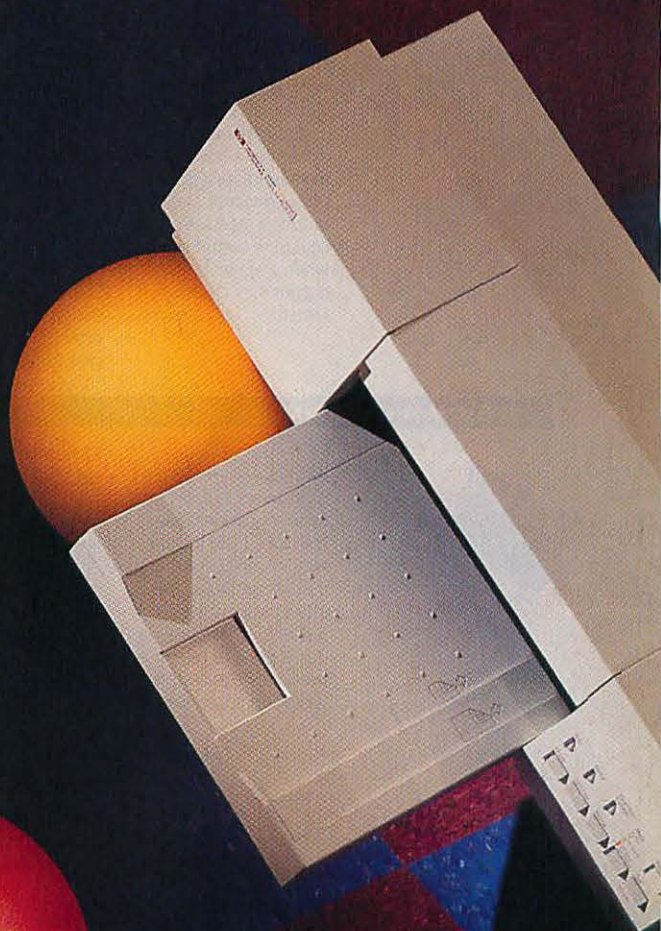
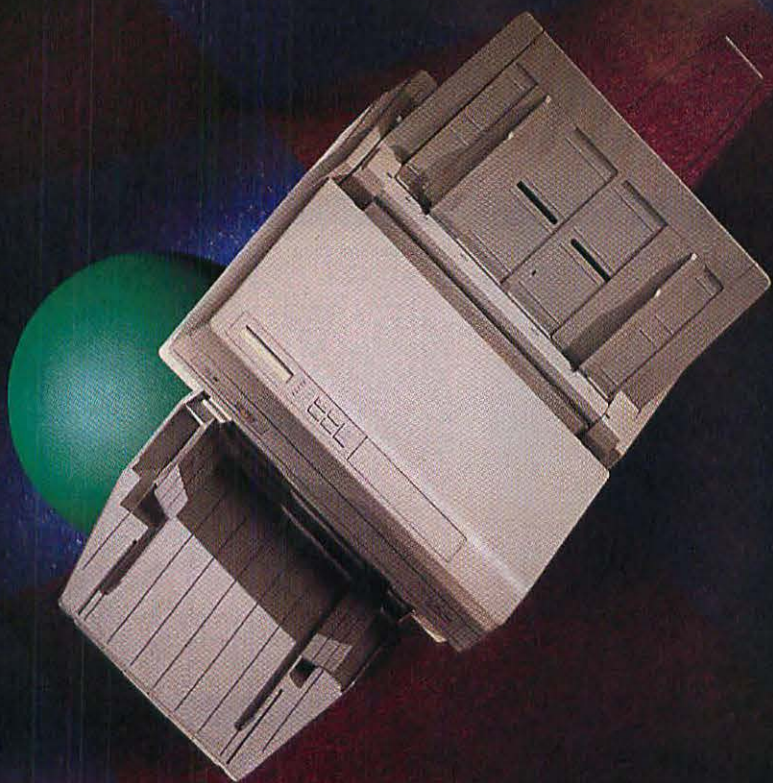
Media Flexibility

DO YOU WANT TO PRINT ON PLAIN PAPER? Forget dye-sub printers. They require special—and expensive—paper designed to absorb the printer's dyes. The latest liquid ink-jets print on plain paper, but the results can look splotchy—a little like using a fountain pen to write on a paper towel. A few thermal-wax printers, such as units from Tektronix, QMS, NEC, and Seiko, can print on plain paper, and even these printers require premium laser bond. Most thermal-wax printers use a lightweight, coated paper that feels flimsy. If you want the wide-ranging plain-paper support that monochrome laser printers provide—the ability to feed in everything from letterhead to card stock—you need to consider a solid ink-jet printer such as the Tektronix Phaser III PXi.

For many people, printing business letters in color isn't nearly as important as printing color overhead transparencies for presentations. All color printers can print on transparency film, but in general, thermal-wax machines produce the best results.

The finish and durability of output varies from one technology to another. Liquid ink-jet output smears when wet. Solid ink-jet output has a textured, matte

by Jim Heid



Seiko Personal Color-Point PSE (top), Hewlett-Packard Paint-Jet XL300 (right), and Mitsubishi International ColorStream/DS.

Find the Right Printer for the Job

INK-JET



Starting at about \$800, ink-jet printers represent the only inexpensive color-printer option. They work well for presentations, simple transparencies, business graphics, and rough proofing. But except for a few high-end models, ink-jets do not offer PostScript and their output is mediocre. And liquid-ink output smears when wet, while solid-ink output may crack when folded.

11% enlargement



Ink-jet output tends to look splotchy or muddy, and often shows obvious banding when one color changes gradually to another.

500% enlargement



Ink-jets *dither*—use dot patterns of primary colors to trick the eye into seeing other shades. This obscures fine details and subtle color shifts.

THERMAL-WAX



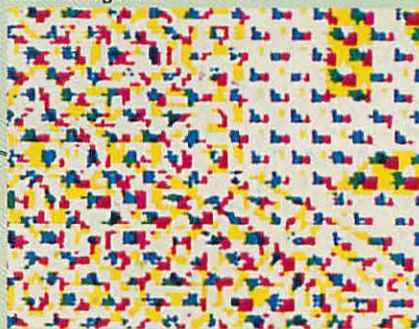
With its vivid colors, plain-paper support, and network options, thermal-wax is the technology of choice for routine business graphics and other business uses. This technology also produces the best overhead transparencies and works well for prepress proofs.

11% enlargement



Printed areas show an appealing gloss, though banding in gradual color changes can be a problem.

500% enlargement



Dithered images can lose fine details and subtle color shifts.

DYE-SUBLIMATION



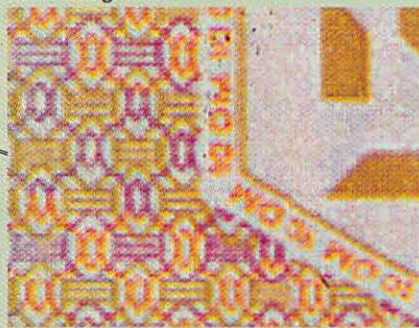
Dye-sublimation printers provide brilliant, photographic-quality images. They represent the only desktop option for top-quality proofing and digital photography. But these machines start at about \$7000, and each print costs about \$5 and requires special coated paper.

11% enlargement



Output is unmatched in its smooth color gradations and clear, sharp details. It looks and feels like a photograph.

500% enlargement



By mixing inks instead of dithering, dye-sublimation alone reveals the tiny "10DM" text in the above detail.

finish that can crack after repeated folding. Thermal-wax gives printed areas of the page an appealing gloss. Pages from a dye-sub printer are glossy in all areas of the page, including white space, and text printed on dye-sub machines looks a little out of focus.

PostScript versus QuickDraw

IN THE MACINTOSH WORLD, BUYING ANY kind of printer means choosing between one that uses PostScript, the page-description language of desktop publishing, or buying one that relies on QuickDraw, the Mac's built-in software for

creating text and graphics. A PostScript printer contains its own computer, or controller, that interprets PostScript-language commands coming from the Mac and translates them into the dots that form the printed image. A QuickDraw printer, on the other hand, relies on the

Mac to perform the calculations required to print a page. As a result, QuickDraw printers cost less but tie up the Mac. Hewlett-Packard's PaintJet XL300 retails for \$3495 in its QuickDraw form; with PostScript, the tab rises to \$4995.

But a PostScript printer is a better choice for printing desktop publications and illustrations created with PostScript drawing programs such as Aldus Free-Hand and Adobe Illustrator. Most PostScript color printers include or accept an optional SCSI hard drive that can store fonts and provide other performance-boosting benefits I'll describe shortly.

For presentation materials and scanned images, a QuickDraw printer suffices. It is also possible to coerce QuickDraw printers into supporting PostScript by using emulation software such as Freedom of Press Professional from ColorAge (508/667-8585; formerly Custom Applications).

In last year's color-printer roundup, only one ink-jet printer had built-in PostScript. This year, PostScript is built in or available as an option for five ink-jet models. Among thermal-wax machines, PostScript is common. At the high end, numerous PostScript dye-sub models are now available (only two were last year).

If you opt for PostScript, you need to choose between the real thing and a clone. Some printers use true Adobe Systems PostScript interpreters, but many use clone interpreters—they understand PostScript but were created by other firms. In the past, true Adobe PostScript produced smoother text quality when printing Type 1 downloadable fonts—the most popular format for fonts that you buy to supplement a printer's built-in fonts. Improvements in clone interpreters have virtually erased this quality gap.

Compatibility is the larger issue, and the most difficult to quantify. No PostScript clone we tested had compatibility problems—each successfully printed our test documents. But problems could surface in the future—as they did last year, when numerous PostScript clones choked on Adobe's newly released Multiple Master fonts (see "Personal Printers," *Macworld*, September 1992). The clone developers responded with updates, but until the updates became available, clone owners were barred from a significant new font technology.

To complicate matters, Adobe interpreters come in two flavors—Level 1 and Level 2. In theory, Level 2 PostScript offers additional benefits for color printing, including image decompression and device-independent color capabilities. With the latter feature, the time-consuming translation of colors in an image

into colors that a given printer can render is handled by the printer's Level 2 interpreter.

Color Accuracy

OK, PUT ON YOUR GARDENING GLOVES; we're about to discuss one of the thorniest issues facing the industry: color matching.

For pie graphs and bullet charts, you may not care if the output doesn't exactly match the colors on screen. But color accuracy is critical for publication proofs and scanned images. Monitors create color by combining red, green, and blue light; printers create color by combining cyan, yellow, magenta, and black pigments. This means that what you see on screen is rarely what appears on paper.

If Adobe can deliver on its Level 2 promises, Level 2 could solve this problem. But some pieces are missing. The Level 2-aware version of the Mac's PostScript printer driver software—under development by Adobe and Apple for years—should finally be available by the time you read this. We'll have to see how well it works.

And in order for a Level 2 printer to be able to pleasingly render everything from color scanned images printed on white paper to corporate logos printed on off-white letterhead, a variety of complex software components are required. One such component is a color-management system such as Apple's new ColorSync. Alas, the first release of the Level 2 driver will not support ColorSync.

In the meantime, numerous firms, including Kodak and Electronics for Imaging (EFI), have developed color-management systems—software and, in some cases, calibration hardware—that offer greater fidelity between screen and page (see "Managing Color," *Macworld*, January 1993).

Networking Features

WHEN BUYING A COLOR PRINTER FOR the office, you probably want each Mac—and perhaps also your DOS PCs—to be able to access the printer. PostScript and networking go hand in hand: all PostScript printers provide a LocalTalk port for connecting Macs and LocalTalk-equipped DOS PCs. A growing number of printers also include Ethernet ports—or offer them as options.

If you print from DOS PCs as well as Macs and don't want to buy LocalTalk boards for the PCs, look for a printer that offers an *all ports active* feature: all the ports are always listening for data. When a print job arrives at one port, other ports are temporarily disabled. The benefit is that you need not flick switches to tell the

printer which port to use. Some printers from QMS, Seiko, and General Parametrics provide an even better variation—the ability to temporarily store incoming jobs on the printer's hard drive, allowing the printer to accept jobs from various ports at the same time.

As for QuickDraw printers, every machine tested can be shared on a network. You couldn't say that last year.

Speed

COLOR PRINTER PERFORMANCE IS OFTEN measured in minutes per page, not the pages per minute of monochrome laser printers. This year's color printers are, on average, faster than last year's—not to damn them with faint praise. Color output requires more processing time than does black-and-white output, as the controller—whether built-in or Mac-based—has to figure out how much cyan, yellow, magenta, and black ink to apply in order to create various hues. For QuickDraw printers, this means that the faster your Mac, the faster the printer. Beyond processing time, the actual printing process takes longer for color than for black-and-white laser printers, too.

Time to Buy?

IS THIS THE YEAR TO BUY? FALLING prices, rising quality, and imminent availability of system-level color management, have brought desktop color printers closer than ever to the mainstream of personal-computer peripherals. Still, it will be some time before color printers become as common as color monitors. One reason is cost: today's color printers are slower, are more expensive, and cost more to operate than monochrome printers.

Another reason is common usage: many business documents are photocopied for distribution, and nearly all copiers are color-blind. Adding color charts or diagrams to a multipage report means printing the color pages separately and then collating them into the final product—a labor-intensive job.

There may come a time when you won't think about buying a *color* printer any more than you think about buying a *color* television. Until then, color printers will remain specialized devices primarily for publishers and presenters. The good news for those groups is that the latest batch of machines is the best ever. Color printers may not have entered the mainstream yet, but they are most definitely making waves. **m**

Contributing editor JIM HEID is coauthor of *Inside the Apple Macintosh* (Brady, 1992) and author of *Macworld Complete Mac Handbook* (IDG Books Worldwide, 1992).

Ink-Jet

Macworld Lab faces off ten solid and liquid

CHOOSING A COLOR ink-jet printer used to mean living with limitations: muddy output, special paper, no PostScript, and slow performance. Today's color ink-jets are not going to break any speed limits, but they are faster and more flexible than ever. Most of last year's models produced between 180 and 300 dots per inch and required special coated paper. This time around, most have resolutions of 300 dpi or 360 dpi and can print on plain paper.

As Macworld Lab tests of ten color ink-jet printers show, these machines produce surprisingly good results, considering their cost. Hewlett-Packard's HP DeskWriter 550C retails for \$1099 and often sells for between \$700 and \$800. More-expensive ink-jets, such as the \$3495 HP PaintJet XL300 and the \$2349 Apple Color Printer, can handle paper as large as 11 by 17 inches (tabloid). This capability in a thermal-wax transfer printer costs several thousand dollars more.

The software that drives the printers has also evolved. Printer drivers for QuickDraw printers have improved significantly for printing scanned images and color blends (see "Output Quality Varies Widely"). Today's QuickDraw drivers are better at *dithering*, the process of applying dots in patterns to simulate hues other than cyan, magenta, yellow, and black (CMYK); red, green, and blue (RGB); and white.

PostScript has become more preva-

lent, too. You'll find PostScript support in Tektronix's Phaser III PXi Color Printer, Lexmark International's IBM 4079 Color Jetprinter PS, and Dataproducts Corporation's Jolt PS. HP offers a PostScript option for its PaintJet XL300. All of these PostScript machines offer enhanced dithering options that produce much sharper output of scanned images than did early PostScript color printers.

Liquid Ink versus Solid Ink

MOST INK-JETS SPRAY FINE STREAMS OF liquid ink through minute nozzles located in disposable ink cartridges. The ink itself consists of dyes dissolved in a water-based medium. Canon and Hewlett-Packard have worked hardest on this liquid-ink technology; indeed, every liquid ink-jet reviewed here uses either an HP or Canon print mechanism.

We tested two ink-jet printers—Tektronix's Phaser III PXi and Dataproducts' Jolt—that use solid inks, which are melted before being applied to the page. The Phaser III PXi and Jolt are *phase-change* ink-jet printers, so named because the ink changes phases from a solid to a liquid and back again when applied to paper.

Phase-change ink-jet printers use ink sticks that look like mutants from the Crayola factory—fat, colorful wedges of wax containing adhesives and dyes. The dyes are not water-soluble, so output doesn't smear if it gets wet.

The Jolt and Phaser III PXi apply ink in the manner of conventional ink-jets. But the ink solidifies on the page before the paper's fibers can absorb much of it—

the chief problem with liquid-ink printers. Solid ink sits on the paper, giving a slightly textured feel to printed areas.

Because very little ink soaks into the paper, solid inks tend to deliver more brilliant colors than liquid ink. Solid-ink printers generally have larger color gamuts—they can reproduce a wider range of colors. Solid ink-jets aren't as finicky about paper quality, either, delivering better results than liquid ink-jets on inexpensive photocopier bond.

Solid ink's real weakness is with transparencies. The solidified beads of ink scatter light that's transmitted through them, giving projected transparencies a washed-out, almost black-and-white appearance. Both Tektronix and Dataproducts sell desktop laminating machines that fix the problem by adding a layer of material that has the same optical density as the beads. But this adds to the printer's cost and adds a manual step to the printing process. If you plan to print transparencies extensively, try a liquid-ink or a thermal-wax machine.

Macworld Lab tested ten ink-jet printers for image quality, media handling, and performance. (See "Find the Right Feature Mix" for the vital statistics, and "How Fast Are the Ink-Jet Printers?" for the performance results.)

Liquid-Ink Options

Apple Color Printer Apple has finally released its first serious color printer. (The ImageWriter II dot matrix printer supports a color ribbon, but calling it a color printer is generous.) The Apple

by **Jim Heid**

Color Printer uses the 360-dpi Canon BJC-C80 mechanism, whose tray holds 100 sheets of up to 11-by-17-inch paper. This engine can print on plain paper, thanks to a fast-drying ink formulation. The printer uses four ink cartridges (for cyan, magenta, yellow, and black).

The Apple Color Printer connects to the Mac via the SCSI port and can be made available to other Macs on a LocalTalk network. However, the Mac slows down as it processes other users' jobs. This drawback doesn't apply to the QuickDraw ink-jets from HP or Canon.

The Apple printer uses a QuickDraw-based driver. The driver interface is easi-

ink-jet printers

er to use than Canon's and HP's, which are a bit jargon-heavy. Clicking on the Color button opens a dialog box that enables you to adjust ColorSync color-matching options. Unlike HP's and Canon's drivers, Apple's doesn't let you adjust the intensity of the printed image. (Reducing the intensity can reduce color bleeding when printing on plain paper.)

Apple's new GrayShare QuickDraw driver technology adjusts the dots applied to the page to improve the quality of printed scanned images and color blends—at least in theory. The Apple printer's test output was often inferior to that of the competition. Fine details were blurred or disappeared entirely, and subtle color gradations in scanned images sometimes appeared splotchy.

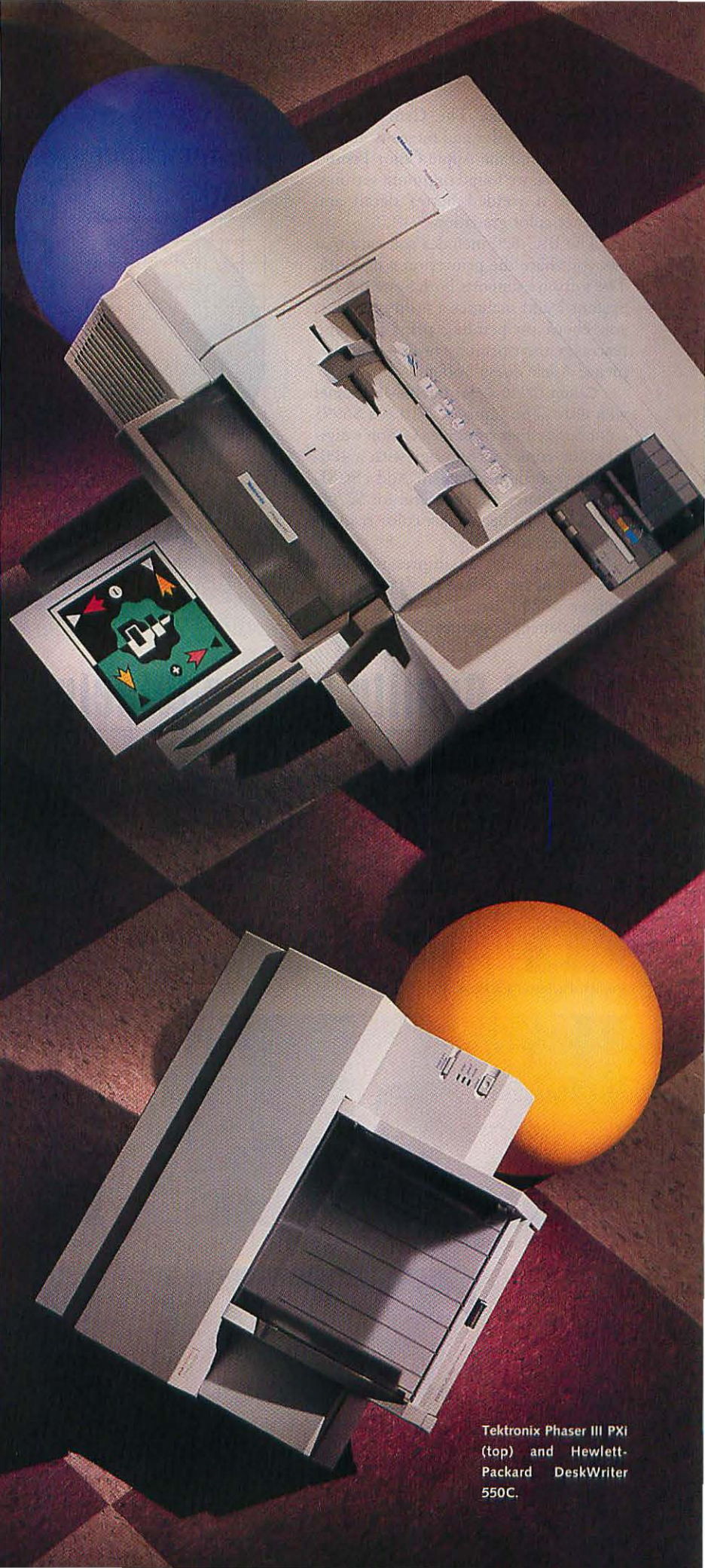
The Apple Color Printer was also consistently slower than the QuickDraw version of the HP PaintJet XL300 and was often slower than Canon's BJC-820. In the MacDraw Pro test, the Apple Color Printer was slower than any other printer tested.

At \$2349, the Apple Color Printer is the least expensive tabloid-capable printer tested, but weigh that against its inferior performance and output quality—and against the fact that Apple does not offer a PostScript upgrade.

Canon BJC-820 Think of this printer as a faster Apple Color Printer with better output, but with a slightly less-friendly driver. The \$2995 BJC-820 has the same paper-handling features and SCSI connection scheme as the Apple, and the same 360-dpi resolution. The BJC-820 also has a Centronics parallel port for connecting DOS PCs, making it better for mixed-platform offices.

The QuickDraw-based driver lets you adjust print intensity and offers two

PHOTOGRAPH BY MARK JOHANN/ILLUSTRATION BY MARK FOX



Tektronix Phaser III PXI
(top) and Hewlett-Packard
DeskWriter 550C.

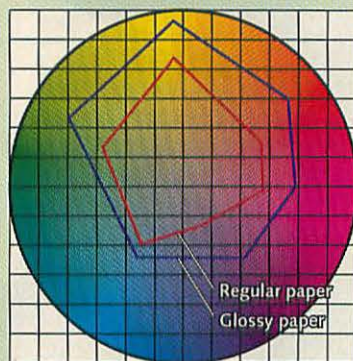
dithering options. The Canon driver required more color and intensity adjustments than did the Apple Color Printer driver. Once we found optimum settings, however, it yielded better detail and smoother color gradations.

The BJC-820 includes software that lets you share the printer on a network. The software supports both System 6 and System 7 and includes a utility that lets you check on pending print jobs and rearrange their printing order—a convenience Apple doesn't offer.

Canon CJ-10 Color Bubble-Jet Copier with IPU The Canon CJ-10 is a \$6995 color copier that combines Canon's digital color-copier technology with a 400-dpi ink-jet print mechanism. Add a SCSI-based computer interface unit for \$2700, and the CJ-10 becomes a color scanner and printer, too.

The CJ-10 is an impressive color copier. You can reduce to 50 percent or enlarge to 200 percent as well as adjust color balance, brightness, and contrast.

Better Paper Allows More Colors



Better-quality paper generally expands the gamut, or range, of colors that ink-jet printers can offer. Hewlett-Packard sells a glossy paper that dramatically improves the gamuts HP printers offer, as shown in gamut testing for the HP PaintJet XL300, above.

Instead of scanning the entire page in one pass and then printing it, the CJ-10 scans a narrow band, prints it, and then repeats the process. Letter-size paper—the largest the CJ-10 can handle—takes roughly 90 seconds. It supports transparency film, but not plain paper.

The CJ-10's computer interface unit includes a QuickDraw driver similar to that of the BJC-820, as well as a utility that enables you to scan images directly into Adobe Photoshop. The printer driver also enables you to correct a document's colors using one of several pre-configured correction settings. You can also create your own settings.

The CJ-10 accepts a 35mm slide attachment that lets you scan slides, and a video adapter that can connect a video camera or other video source. This makes for a versatile device, but one that quickly gets pricey as you add accessories. You can easily buy a separate color flatbed scanner, slide scanner, and color printer for less than \$9695. The CJ-10's appeal is

Output Quality Varies Widely



Hewlett-Packard PaintJet XL-300



Dataproducts Jolt PS



Hewlett-Packard DeskWriter C



Canon BJC-820



Lexmark International IBM 4079 Color Jetprinter PS



Hewlett-Packard PaintJet XL300-PS

that it gives you these peripherals—plus a slick color copier—in one package.

Hewlett-Packard HP DeskWriter 550C
The \$1099 HP DeskWriter 550C is the latest in a series of inexpensive color ink-jet printers from HP. Its predecessor was the DeskWriter 500C, which used a disposable ink cartridge containing cyan, yellow, and magenta chambers. The 550C adds a second ink cartridge for black, eliminating the need to produce black by applying all three primary colors. (This derived black is called *composite black*, and is often slightly brownish.)

HP also improved the ink formulations to allow the DeskWriter 550C to print on plain paper (including envelopes), although the results aren't as good as those of the costlier HP PaintJet XL300. HP's line of ink-jet papers works best. The LX JetSeries Glossy Paper is actually laminated with a plastic transparency-like film that does wonders for presentation graphics and scanned images; because more ink sits on the sur-

face of the paper, the printer's color gamut is enlarged significantly (see "Better Paper Allows More Colors"). At \$59.95 for 50 sheets, however, the glossy paper is a bit pricey.

The DeskWriter 550C's QuickDraw-based driver provides a wide selection of dithering, color control, and intensity options. Overall performance was better than average, except for the presentation graphic test. A LocalTalk port allows network sharing.

The 550C's tricolor cartridge has drawbacks. Because the ink chambers are small, you're likely to run out of ink often. And if you run out of one color, you must replace the entire \$34.95 cartridge. Still, the DeskWriter 550C is a great value.

Hewlett-Packard HP PaintJet XL300
The HP PaintJet XL300 is the successor to the PaintWriter XL, which produced 180-dpi output. With the PaintJet XL300, HP boosted the resolution to 300 dpi and added plain-paper support. A heating element in the printer dries the

ink almost immediately, preventing it from soaking into the paper.

The PaintJet XL300's four ink cartridges aren't keyed, so it's possible to insert a color in the wrong slot. Another surprising flaw: the printer doesn't detect when a cartridge is empty. This could result in a lot of wasted paper or, worse, costly transparency film.

The PaintJet XL300 is built for networking and expansion. LocalTalk and Centronics parallel ports are built in; Ethernet, Token Ring, and other network interfaces are optional. A Level 2 PostScript controller upgrade retails for \$1495. (Regarding PostScript Level 2 capabilities, see "How to Buy a Color Printer" in this issue.) The PostScript upgrade installs easily in a front-panel slot and also adds support for the Hewlett-Packard Graphics Language (HPGL/2) used by pen plotters, ensuring the printer's compatibility with computer-aided design and engineering software. All ports are active simultaneously, and the printer



Hewlett-Packard DeskWriter 550C



Original



Apple Color Printer



Canon CJ-10



Tektronix Phaser III PXI

Compared against the original image (this page, top right), the inexpensive HP DeskWriter 550C (this page, top left) shows good color fidelity, except for a slight overall lightening. Its effective dithering scheme holds sharp details, as seen in the scientific diagram at the left of the image. In contrast, fine print was illegible as rendered by the Apple Color Printer (this page, middle left). The 400-dpi Canon CJ-10 (this page, bottom right), though offering the sharpest details in the group, suffers from significant darkening of all shades.

switches emulation modes automatically. Mac and Microsoft Windows drivers are included.

The PostScript-equipped PaintJet XL300-PS was among the slowest machines tested. The Photoshop test scan took 24 minutes to print; on the QuickDraw XL300 it took only 7 minutes. There were similar disparities in all tests except the PowerPoint presentation graphic, where the PostScript XL300 was negligibly slower. The printers' QuickDraw and PostScript drivers offer several halftone screening settings as well as options for color-matching output to the screen. In all, the PaintJet XL300 yielded excellent output—with better color fidelity than the Canon, Apple, or IBM machines.

IBM 4079 Color Jetprinter PS The \$3495 Color Jetprinter PS uses the same engine as the Canon BJC-820 and the Apple Color Printer, but controls it with Phoenix Technologies' PhoenixPage PostScript-clone interpreter. An enhanced screening option called ColorGrade provides much better results than PostScript's standard halftoning.

The Jetprinter PS includes an installer utility that modifies Apple's PostScript driver (the LaserWriter file) to add options. Beware of the high-quality printing option: choosing it causes the print head to pause for eight seconds at the end of each pass to allow the ink to dry thoroughly. This prevents each pass from bleeding into its neighbors but slows printing dramatically.

The Jetprinter PS is the least-expensive PostScript color printer tested. If you

MW

EDITORS' CHOICE

Low-End Liquid-Ink Printers

HP DeskWriter 550C It's no prepress proofing tool, but its output quality may surprise you. With a street price between \$700 and \$800, there isn't a better way to test the waters of liquid ink-jet color printing. Company: Hewlett-Packard. List price: \$1099.

Midrange Liquid-Ink Printers

HP PaintJet XL300 This unit has the expansion options its competitors lack: a generous choice of network interfaces and a PostScript Level 2 option. Output quality is excellent. Company: Hewlett-Packard. List price: \$3495.

Solid-Ink Printers

Phaser III PXi Color Printer The only printer in its price range that has the paper-handling flexibility that monochrome printers provide. The controller offers fast performance, PostScript Level 2, and sharp prints of scanned images. Company: Tektronix. List price: \$9995.

long for the PostScript-equipped HP PaintJet XL300-PS but can't swing its \$4995 price, consider this one.

Clear Choice in Solid Ink

Dataproducts Jolt PS The \$6695 Dataproducts Jolt is the less expensive and slower of the two solid-ink machines tested. The Level 2 PostScript-based Jolt PS handles up to legal-size plain paper.

The Jolt's output quality isn't as good as the Phaser III PXi's. Print a bar with gradual color changes, and you'll notice bands at regular intervals. Jolt output is less durable, too. Fold a printed page, and the ink cracks and begins to flake off.

A front-panel Mode switch lets you choose between paper and transparency printing modes as well as two halftone-screening options. Most PostScript printers provide small liquid crystal displays for status messages, but the Jolt uses flashing lights—a slow flash means one thing, a fast flash means another, and it's easy to forget what means what. If you're in the \$6000 price range and want plain-paper output, consider one of the plain-paper thermal-wax machines from QMS, Tektronix, or Seiko instead.

Tektronix Phaser III PXi The second of the two solid-ink printers tested, the Phaser III PXi is more refined and more capable than the Jolt. At \$9995, it's also the most expensive ink-jet printer reviewed here.

The PostScript Level 2-based Phaser III PXi can print on paper as large as 12 by 18 inches (full-bleed tabloid). Add 4MB of memory to bring the printer's total to 14MB, and you can print proofs of tabloid-size publications that have bleeds (printed areas extending to the edges of the page). This combined with the ability to print on plain paper—including card stock—has made the Phaser III PXi popular among publishers.

Last June, Tektronix shipped an updated Phaser III PXi whose controller contains improved halftoning software called Finepoint that does wonders with

FIND THE RIGHT FEATURE MIX

Company	Phone	Product	Tested by Macworld Lab	Price	Page-Description Language	Standard Ports/Optional Ports/All Active	Emulations/Autosensing
Apple Computer	408/996-1010, 800/776-2333	Apple Color Printer	yes	\$2349	QuickDraw	SCSI/none/NA	NA/NA
Brother International	908/356-8880, 800/284-4357	HS-1PS	no	\$9995	BR-Script Level 1	L, P, S/none/yes	HPGL, PCL4/yes
Canon Computer Systems	714/438-3000, 800/848-4123	Canon BJC-820	yes	\$2995	QuickDraw	P, SCSI/none/yes	Epson LQ-2550/no
		CJ-10 Color Bubble-Jet Copier with IPU	yes	\$9695	QuickDraw	SCSI/none/none	NA/NA
Dataproducts Corporation	818/887-8000, 800/776-7788	Jolt PS	yes	\$6695	Adobe Level 2	L, P, S/none/yes	HPGL, PCL4/no
Hewlett-Packard	800/752-0900	HP DeskWriter C	yes	\$779	QuickDraw	L, S/none/yes	NA/NA
		HP DeskWriter 550C	yes	\$1099	QuickDraw	L, S/none/yes	NA/NA
		HP PaintJet XL300	yes	\$3495	QuickDraw	L, P, S ¹ /yes	NA/NA
		HP PaintJet XL300-PS	yes	\$4995	Adobe Level 2	L, P, S ¹ /yes	HPGL/2, PCL5/yes
Lexmark International	606/232-2000, 800/358-5835	IBM 4079 Color Jetprinter PS	yes	\$3495	PhoenixPage Level 2	L, P, S/none/yes	HPGL/yes
Tektronix	503/682-7377, 800/853-6100	Phaser III PXi Color Printer	yes	\$9995	Adobe Level 2	L, P, S/E, T/yes	HPGL/no

E = Ethernet, L = LocalTalk, P = parallel, S = serial, T = Token Ring. Technical-support ratings are based on a series of calls made to each company by Macworld staffers (posing as customers) system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only those companies whose products Macworld Lab tests.

¹ HP PaintJet XL300 accepts any of numerous HP JetDirect network boards; adapters are available for Ethernet, Unix (TCP/IP), Token Ring, and others. * The Phaser III PXi can accept any size



How Fast Are the Ink-Jet Printers?

■ = Fastest result in test.
Shorter bars are better. Products are listed in order of overall performance, from fastest to slowest. Times are in seconds.

Object-Oriented Graphic

Print speed for a complex color MacDraw Pro document with more than 840 color objects, most of them gradient-filled.

PostScript Graphic

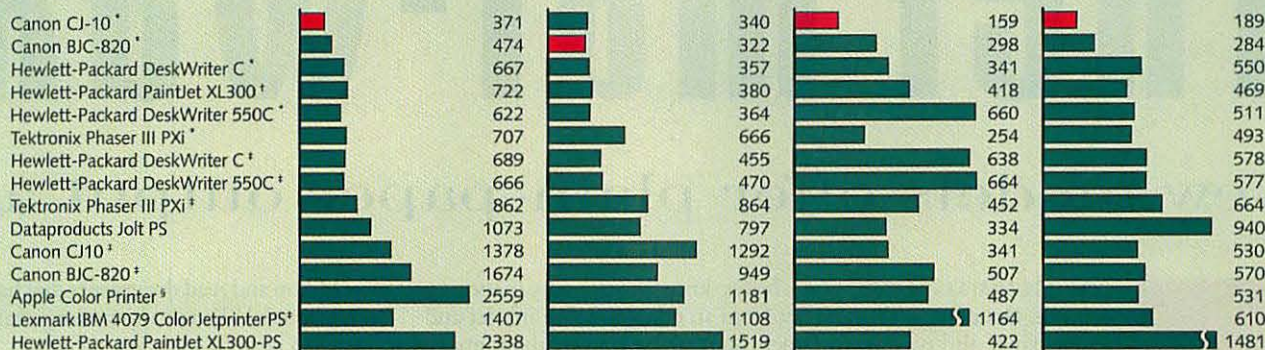
Print speed for graphics that include special PostScript effects. We used a FreeHand illustration with nonlinear blends and Bézier curves.

Presentation Graphic

Print speed for a PowerPoint transparency with a color gradient background and several lines of text in the Times font.

Scanned Image

Print speed for a 910K, 72-dpi, 9 1/2-by-6 1/2-inch scanned Photoshop image with many shadow details.



* Faster mode. † QuickDraw version. ‡ Higher-quality mode. § With ColorSync off.

scanned images. The printer also includes Tektronix's TekColor drivers, which provide several color-matching schemes and let you preview printed colors on screen. The Phaser III PXi's solid inks mean second-rate transparencies, but with its Fine-point and color-matching technologies, it's an excellent printer for graphic arts and technical applications.

Brother International recently announced a solid-ink printer. The \$9995 HS-1PS uses Brother's BR-Script Post-

Script-clone interpreter and a Brother-built print engine that can print tabloid-size bleeds. What's noteworthy about the HS-1PS is that it addresses the washed-out-transparency problem with a built-in mechanism that remelts the ink to change the shape of the solidified droplets. This mechanism, which Brother calls a transparentizer, eliminates the need for a laminator. The HS-1PS was not available for testing, but the Brother-supplied output samples I examined looked impressive.

HP Is on Top

ALL IN ALL, HEWLETT-PACKARD'S PRINTERS delivered better output and better performance than the competition. The HP DeskWriter 550C provides a generous mixture of affordability and output quality. The HP PaintJet XL300 costs the same as the large-format machine from Lexmark International, and more than those offered by Apple and Canon. But the XL300 offers superior output and more expansion options.

As for the solid-ink offerings, both the Dataproducts Jolt PS and the Tektronix Phaser III PXi produce excellent results on plain paper, but not with transparencies. The Phaser III PXi is the better of the two, and remains a good choice for publishing applications.

Today's liquid-ink printers are still on the slow side and are still a bit finicky about paper, while the solid-ink machines have problems with transparencies. Liquid ink's disadvantages are likely to remain, but this technology's relatively low cost offsets them. Solid ink's future looks promising, but expensive. Despite the improvements in the latest generation of printers, buying an ink-jet printer still means making some compromises. **m**

Contributing editor JIM HEID is coauthor (with Peter Norton) of *Inside the Apple Macintosh* (Brady, 1992) and author of *Macworld Complete Mac Handbook* (IDG Books Worldwide, 1992).

Macworld Lab testing supervised by MARK HURLLOW.

RAM (base model/maximum)	Resolution (in dots per inch)	Number of Fonts	Paper Sizes	Tray Capacity (in sheets)	Technical Support
NA/NA	360	64	A, A3, A4, lgl, B	100	NA ¹
10MB/26MB	300	35	A, lgl	100	NA
NA/NA	360	3	A, A3, A4, lgl, B	100	satisfactory ²
NA/NA	400	0	A	90	unsatisfactory ²
6MB/10MB	300	39	A, A4, lgl, B	200	satisfactory
NA/NA	300	13	A, A4, lgl, B	100	good
NA/NA	300	35	A, A4, lgl, B	100	good
2MB/18MB	300	35	A, A4, AB, lgl, B, B4	200	good
6MB/18MB	300	35	A, A4, AB, lgl, B, B4	200	good
4MB/16MB	360	35	A, A3, A4, lgl, B	100	excellent
10MB/22MB	300	39	⁴	200	excellent

to gauge the accessibility, helpfulness, and accuracy of the company's support technicians. Macworld uses a point

¹ Printer not on sale long enough to test technical support. ² Each product tested independently for this company. from 4 by 6 inches to 12 by 18 inches.

Thermal-Wax

New models offer plain-paper output and

FOR THERMAL-WAX printers, the news is all about paper and price. While print quality has held fairly steady in the past year, several machines now print on plain paper—not the wide range of exotic papers and card stocks that monochrome laser printers can handle, but photocopier or laser-printer bond. Besides providing alternatives to the flimsy-feeling special paper to which some thermal-wax printers are still limited, plain-paper support eliminates the need to stock yet another category of office supply.

Meanwhile, prices are dropping into the office-laser-printer range, with one high-end machine, the Tektronix Phaser 200e, retailing for less than \$4000, and one low-end newcomer, the forthcoming LaserMaster Crayon-FX, announced at a cost of only \$1495. Thermal-wax inks give printed areas of the page an appealing gloss that ink-jet printers can't match. And speed is up—as a group, the nine thermal-transfer printers tested by Macworld Lab were the fastest printers evaluated for this series.

How Thermal-Wax Printers Work

THERMAL-WAX PRINTERS PRODUCE output through a combination of heat and pigmented wax. Inside the printer is a roll of plastic film coated with wax-based pigments of each process color (cyan, magenta, yellow, and often, black—or CMYK). Each ink panel is the size of a full page, and a set of three or four panels is used in the course of printing a page. As a result,

you always know how many pages to expect from an ink roll. With ink-jet and monochrome laser printers, the number of pages per cartridge depends on the amount of ink or toner that is applied to each page.

The print head in a thermal-wax printer contains thousands of heating elements that turn on and off to print individual dots, melt the wax, and thereby transfer ink to the paper. Nearly all thermal-wax printers can apply up to 300 dots per inch.

A page makes several trips past the print head. After the dots for the first process color are applied, the page briefly appears in the output tray as the ink ribbon advances to the next panel. Then the printer draws the paper back in and applies the next process color. The printer's mechanism must position the paper accurately for each pass, lest registration and color quality suffer.

Most thermal-wax printers accept either a three-color (CMY) or four-color (CMYK) ink ribbon. (Some machines also accept a black-only ribbon and produce color separations by printing one page for each process color.) Printing with a three-color ribbon is the fastest, since it requires one less pass. Without the black-ink panels, however, the printer must print black areas as composites of cyan, magenta, and yellow ink, which sometimes produces muddy-looking blacks.

The ink ribbon is attached to a take-up spool around which spent ink panels are wound. This presents a potential security problem: someone can unwind the

used ribbon and read documents that have been printed. When security is important, be sure to destroy spent ink rolls.

With three (or four) entire ink panels used for every printed page, you may think that thermal-wax printers cost more to operate than ink-jets. That can be true for documents containing only small areas of color, but if you print overhead transparencies or other colorful pages, thermal-wax output often costs less. Put another way, the cost per page of ink-jet output varies depending on the amount of ink used, but the cost per page of thermal-wax output is the same regardless of how much color you use. (The lesson is to beware of the cost-per-page figures used by ink-jet vendors. Such estimates are meaningless unless they specify the colors used and the amount of coverage.)

Thermal-wax transparencies aren't just more economical, they're also more vivid than ink-jet transparencies. The wax-based inks adhere well to transparency film and don't diffuse projected light to the extent that liquid and solid inks do. Given these quality, speed, and potential economic advantages, thermal-wax represents the best technology for printing overheads and other presentation materials.

The Media Elite

MANY INK-JET PRINTERS CAN'T USE plain paper effectively because ink wicks into the paper before drying, blurring the image. Plain paper presents different challenges to a thermal-wax printer. The surface of a sheet of plain paper is not

by **Jim Heid**

smooth, but a bumpy mélange of criss-crossing fibers. Adhering a smooth, wax-based ink to such a surface is like wallpapering a textured plaster wall—you can do it, but it isn't easy.

All thermal-wax printers used to require special paper with an ultrasmooth surface designed to accept the melting wax. This paper was roll-fed, and a blade within the printer cut the paper to size at the end of the print job. Some printers still rely on such rolls, but a far greater number of units use cut-sheet plain paper (see "Find the Right Feature Mix").

QMS, Seiko, and NEC met the plain-paper challenge by redesigning their print

reduced prices

heads to apply more heat to the ink ribbon, thereby transferring more wax to the paper. In the QMS ColorScript 210, for example, you can select between plain paper and thermal-transfer paper by using a front-panel switch or by choosing an option in the Print dialog box.

Tektronix takes a different approach with its Phaser 200i and 200e printers (which were not shipping at this writing and thus could not be tested, but will replace the Phaser II PXi and II PXe by the time you read this). Tektronix sacrificed the black-ink panel in favor of a special primer medium that the printer applies to all areas of the paper that will hold ink. This primer coat covers the peaks and fills in the valleys of the paper, providing a smoother surface for the inks. It also means all blacks must be printed as composites of cyan, magenta, and yellow, however.

Tektronix claims that this approach allows for a wider range of paper surfaces and finishes. But my tests show that only high-quality paper yields acceptable results.

The trend toward using plain paper is accompanied by the same kinds of paper-handling features as those found on laser printers or photocopiers. Many thermal-wax machines now use slide-in paper trays that hold 50 to 200 sheets. The Tektronix Phaser 200i and 200e will also accept an optional second paper tray—put paper in one and transparency film in the other.

The \$4995 CalComp ColorMaster Plus series are the only color printers available that can print on both sides of a sheet of paper. The ColorMaster Plus doesn't support plain paper, but the special paper it does require has a heavier weight than most thermal-wax papers.

PHOTOGRAPH BY MARK JOHANN/ILLUSTRATION BY MARK FOX



The CalComp ColorMaster Plus (top) and the QMS ColorScript 210.

Compare Both Color and Texture



NEC Colormate PS Model 80



QMS ColorScript 210



CalComp ColorMaster Plus



Brother HT-500PS



Seiko ColorPoint PSX Model 4



Océ Graphics G5241-PS

Printers from Seiko, QMS, Panasonic, General Parametrics, and CalComp can print on a special material that lets you create transfer sheets for fabric and ceramic. Some of these printers also print on offbeat media such as silver peel-and-stick paper (for plaques and nameplates) and static-cling plastic (for signs that stick on windows, with no adhesive). For ad agencies and design studios, the ability to do small, in-house runs of T-shirts and other promotional gimcracks could be more significant than being able to print on plain paper.

Another plus for graphic artists is the ability to print documents with bleeds (printed areas that extend to the edge of the page). Among smaller machines—ones with an 8½-by-14-inch maximum

page size—only the Seiko Personal ColorPoint PSE and ColorPoint PSX Model 4 and the RGB Technology CB8000X (not tested) can print a letter-size bleed. To print tabloid-size documents with bleeds, look at Océ Graphics' G5242-PS, Seiko's ColorPoint PSX Model 14, QMS's ColorScript 230, or RGB Technology's CB8014X (not tested). As for color matching, support for EFI's EfiColor color-management system is available for the Tektronix, QMS, Seiko, and CalComp thermal-wax machines.

Many vendors are also creating *profiles* for Apple's ColorSync. Profiles are data files that describe a printer's color capabilities, such as its color gamut, ink characteristics, and halftone screen fre-

quencies. Together with the color-management software (such as EfiColor or ColorSync), these profiles form an intermediary between an application program and a printer. When you print a document, the color-management system checks the printer profile to translate the colors in the document into ones that can be rendered by your printer.

Speed and Networking

ALL BUT ONE OF THE NINE PRINTERS tested support PostScript. The exception is the \$6295 Panasonic EPL-8534, which uses a QuickDraw-based driver. (Panasonic also sells a version of Freedom of Press software from ColorAge [508/667-8585], which provides PostScript support, however.) This roll-fed printer is unique



Seiko Personal ColorPoint PSE



Original



General Parametrics SpectraStar Q10



Panasonic EPL-8543

Output quality among thermal-wax printers does not vary as widely as with other printer technologies, though these samples show visible differences in color fidelity and image texture. Comparing output against the original image (this page, top right), the Seiko Personal ColorPoint PSE (this page, top left) shows excellent color fidelity, particularly in the hard-to-match green of the leaves in the center of the image, and in the aqua swirls at the far left. The General Parametrics SpectraStar Q10 (this page, bottom left) unduly lightens the same green and aqua. The Brother HT-500PS (facing page, middle right) washes out greens and reds with excess yellow. Thermal-wax devices use dot patterns to create different colors. This can cause severe banding when moving from one shade to the next or in subtle fills, as seen at the lower right of the bird, as rendered by the Panasonic EPL-8543 (this page, bottom right).

in another way: its resolution is only 203 dpi, but it can vary the size of those dots to create continuous-tone images. But I don't recommend this printer. It lacks a LocalTalk port and relies instead on the printer driver for network sharing, a scheme that slows down the Mac to which the printer is connected. Also, the printer can't print on plain paper, and in our testing Panasonic delivered unsatisfactory technical support.

As for the PostScript machines, most use PostScript-clone interpreters rather than Adobe interpreters. Exceptions include the Tektronix, NEC, and Océ Graphics machines. All the clones passed Macworld Lab's compatibility tests, which were designed by Genoa Technology (805/583-2677). Most PostScript

printers (whether clones or not) provide additional emulation modes such as HPGL, the most popular language for pen plotters.

On the test track, the overall winner was Seiko Instruments' PSX series. The Seiko ColorPoint PSX Model 4 finished first. (Actually, it finished a close second to Tektronix's Phaser II PXi, which has since been replaced by the Phaser 200 series and therefore does not appear in our benchmarks.) Slow performers included the Océ Graphics G5242-PS, the NEC Colormate PS Model 80, and the Seiko ColorPoint Personal (see "How Fast Are the Thermal-Wax Printers?").

The forthcoming Tektronix Phaser 200i and 200e boast an innovation that should put them among the fastest

thermal-wax printers. The Phaser 200i and 200e wind the sheet of paper around a circular drum that eliminates the time wasted by partially ejecting a page and then drawing it back into the print engine to print the second and third process colors. Tektronix claims a maximum print speed of 2 pages per minute—still glacial compared with a monochrome office printer's 10 to 20 ppm, but faster than any current thermal-wax printer.

Seiko's ColorPoint PSX series, General Parametrics' SpectraStar series, and QMS's ColorScript 210 and 230 have noteworthy performance-related features. These printers accept optional SCSI hard drives that can store downloadable fonts and incoming print jobs from the Macs on a network. This improves the perfor-

FIND THE RIGHT FEATURE MIX

Company	Phone	Product	Tested by Macworld Lab	Price	Page-Description Language	Emulations/Autosensing	Processor/Clock Rate
Brother International Corporation	908/356-8880, 800/284-4357	HT-500PS	yes	\$4995	BR-Script Level 1	HPGL, PCL4/yes	34010/60MHz
CalComp	717/821-2000, 800/932-1212	ColorMaster Plus †	yes	\$4995	PhoenixPage Level 1	none/NA	i960/16MHz
General Parametrics Corporation	510/524-3950, 800/223-0999	SpectraStar Q10 †	yes	\$4999	Pipeline PowerPage Level 2	HPGL, Targa, Mils G370/no	i960/20MHz
Mitsubishi International	914/997-4999	ColorStream/Plus	no	\$7950	PowerPage Level 2	HPGL/yes	AMD29000/16MHz
NEC Technologies	508/264-8000, 800/632-4636	Colormate PS Model 80 §	yes	\$6299	Adobe Level 1	none/NA	68020/16MHz
Océ Graphics	415/964-7900, 800/545-5445	G5241-PS †	yes	\$6990	Adobe Level 1	none/NA	68020/16MHz
Panasonic Communications	201/392-4932, 800/742-8086	EPL-8543	yes	\$6295	QuickDraw	none/NA	none/NA
QMS	205/633-4300, 800/777-7782	ColorScript 210 †	yes	\$4995	QMS Level 2	HPGL/yes	i960/25MHz
RGB Technology	703/834-1500	CB8000X	no	\$5995	PhoenixPage Level 2	HPGL/yes	i960/25MHz
Seiko Instruments USA	408/922-5800, 800/888-0817	Personal ColorPoint PSE	yes	\$2999	PhoenixPage Level 1	HPGL/yes	i960/16MHz
		ColorPoint PSX Model 4 †	yes	\$5999	PhoenixPage Level 1 ¹¹	HPGL/yes	i960/25MHz
Tektronix	800/853-6100, 503/682-7377	Phaser 200e Color Printer	no	\$3695	Adobe Level 2	HPGL/no	AMD29000/16MHz
		Phaser 200i Color Printer	no	\$5995	Adobe Level 2	HPGL/no	AMD29000/24MHz

Technical-support ratings are based on a series of calls made to each company by Macworld staffers (posing as customers) to gauge the accessibility, helpfulness, and accuracy of the company's support technicians. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only those companies whose products Macworld Lab tests. * E = Ethernet, L = LocalTalk, N = Novell NetWare, P = parallel, S = serial, T = token ring. † B-size model also available. ‡ Other models available equipped with internal hard drives. § Unit with fewer fonts also available. ¹¹ Free upgrade to PhoenixPage Level 2 begins in April 1993. # To evaluate support, we asked questions about the Phaser II PXe and II PXi, which were shipping at the time of testing.



How Fast Are the Thermal-Wax Printers?

■ = Fastest result in test. Shorter bars are better. Products are listed in order of overall performance, from fastest to slowest. Times are in seconds.

Object-Oriented Graphic

Print speed for a complex color MacDraw Pro document with more than 840 color objects, most of them gradient-filled.

PostScript Graphic

Print speed for graphics that include special PostScript effects. We used a FreeHand illustration with nonlinear blends and Bézier curves.

Presentation Graphic

Print speed for a PowerPoint transparency with a color gradient background and several lines of text in the Times font.

Scanned Image

Print speed for a 910K, 72-dpi, 9 1/2-by-6 1/2-inch scanned Photoshop image with many shadow details.

Seiko ColorPoint PSX Model 4	729
Brother HT-500PS	934
General Parametrics SpectraStar Q10	936
QMS ColorScript 210	912
Panasonic EPL-8543	921
CalComp ColorMaster Plus	1086
Seiko Personal ColorPoint PSE	1209
NEC Colormate PS Model 80	1411
Océ Graphics G5241-PS	1349

Seiko ColorPoint PSX Model 4	453
Brother HT-500PS	610
General Parametrics SpectraStar Q10	590
QMS ColorScript 210	494
Panasonic EPL-8543	473
CalComp ColorMaster Plus	677
Seiko Personal ColorPoint PSE	794
NEC Colormate PS Model 80	918
Océ Graphics G5241-PS	899

Seiko ColorPoint PSX Model 4	111
Brother HT-500PS	118
General Parametrics SpectraStar Q10	150
QMS ColorScript 210	132
Panasonic EPL-8543	224
CalComp ColorMaster Plus	138
Seiko Personal ColorPoint PSE	149
NEC Colormate PS Model 80	157
Océ Graphics G5241-PS	215

Seiko ColorPoint PSX Model 4	227
Brother HT-500PS	406
General Parametrics SpectraStar Q10	342
QMS ColorScript 210	811
Panasonic EPL-8543	391
CalComp ColorMaster Plus	388
Seiko Personal ColorPoint PSE	304
NEC Colormate PS Model 80	271
Océ Graphics G5241-PS	755

mance of your network and individual Macs. Instead of waiting for someone else's job to print, the PrintMonitor utility on your Mac immediately transfers your job to the printer's hard drive. As a result, PrintMonitor doesn't take up memory and slow down your machine.

The Seiko ColorPoint PSX series offers an additional feature that will lift the spirits of people who always find their jobs next in line after a massive Photoshop

file. These printers allow small jobs to bypass large ones that are still being transferred from a Mac. If someone on a network starts printing a large Photoshop image and someone else tries to print a PowerPoint transparency a moment later, the ColorPoint PSX will accept, process, and print the transparency while simultaneously storing the incoming Photoshop file.

The QMS ColorScript 210 and 230

owe their ability to store incoming print jobs to QMS's Crown printer operating system, which resides within each printer. The Crown system is also behind these printers' emulation-sensing talents and their ability to accept print jobs from a variety of ports simultaneously. Crown also provides customizing options galore—you can, for example, tell the printer how much hard drive space to use for storing fonts and how much to use for

Standard Ports / Optional Ports/ All Active	RAM (base model/ maximum)	Internal Hard Drive/ SCSI Port	Number of Fonts	Paper Sizes	Resolution (in dots per inch)	Paper Feed	Supports Plain Paper	Technical Support
L, P, S/none/yes	5MB/21MB	no/yes	35	A, lgl	300	100-sheet tray	no	unsatisfactory
L, P, S/none/yes	6MB/34MB	no/yes	35	A	300	100-sheet tray	no	NA
L, P, S/none/yes	10MB/10MB	no/no	52	A, A4, lgl, SA4	300	100-sheet tray	no	excellent
L, P, S, SCSI/E/yes	14MB/38MB	no/yes	35	A, B, SB	300	100-sheet tray	no	NA
L, P, S/E/no	8MB/8MB	no/yes	35	A, A4, lgl	300	100-sheet tray	yes	satisfactory
L, P, S/none/no	4MB/8MB	no/yes	35	A, SA	300	100-sheet tray	no	good
P/none/none	3MB/8MB	no/no	0	A	203	roll	no	unsatisfactory
L, P, S/ E, N, D, T/yes	8MB/32MB	no/yes	65	A, A4, SA4, lgl	300	50-sheet tray	yes	good
L, P, S/E/yes	10MB/34MB	no/yes	39	A, A4, SA	300	roll	no	NA
L, P, S/E, N/yes	5MB/21MB	no/optional	17	A, lgl, A4, A4 lgl, B4	300	100-sheet tray	yes	excellent
L, P, S/E, N/yes	10MB/34MB	no/yes	39	A, A4, SA	300	roll	no	
L, P, S/T/yes	4MB/8MB	no/no	17	A, A4	300	100-sheet tray	yes	excellent *
L, P, S/E, T/no	6MB/14MB	no/yes	39	A, A4	300	100-sheet tray (200-sheet tray optional)	yes	

storing incoming print jobs. QMS's Crown-based printers have the most sophisticated controllers in the industry. Much of their sophistication doesn't show up in specifications tables or benchmarks, but in the real world of complex networks, competing page-description languages, and large documents.

Output Quality

ANY THERMAL-WAX OUTPUT LOOKS better than that of a liquid ink-jet printer (except the liquid ink-jets from Iris Graphics, which start at over \$30,000). But within the thermal-wax world, output quality doesn't vary dramatically (see "Compare Both Color and Texture").

Still, some printers stand out from the pack. The prints produced by General Parametrics' SpectraStar Q10 had colors that were a bit more vivid than most. Macworld Lab measurements (conducted with the assistance of Genoa Technology) show that the Q10 has one of the largest *color gamuts*—range of reproducible colors—of any thermal-wax printer tested.

Seiko's ColorPoint series and prerelease versions of the Tektronix Phaser 200i and 200e (which use the TekColor image-enhancement technologies to improve color fidelity between screen and printer) yield sharp prints of scanned images, thanks to enhanced screening (the process of representing a scanned image as a series of dots). The Seiko printers are hampered by relatively narrow color gamuts, however.

The QMS ColorScript 210 renders fine lines and small text particularly well. QMS is also planning an upgrade to the 210 and 230 that improves screening for printing scanned images. A ROM upgrade will be available for existing machines, but its price had not been determined at press time.

Brother's HT-500PS provides only average output quality and performance and Brother's technical support was unsatisfactory, but the printer does stand out in one way. Add a \$200 controller board, and you can attach an inexpensive, non-PostScript laser printer, such as an HP LaserJet, to the HT-500PS. Flick a switch on the HT-500PS's front panel, and you can use the laser printer for proofing or printing monochrome documents, with the HT-500PS's controller interpreting the PostScript. General Parametrics' \$6799 SpectraStar Q40 accepts an optional film recorder that can make color 35mm slides, which we did not evaluate; the same film recorder is standard equipment on the \$13,798 SpectraStar Q50.

At press time, LaserMaster (800/477-7714) announced the least-expensive thermal-wax to date: the \$1495 Crayon-FX, which prints 203 dpi on high-quality plain paper. The Crayon-FX, which should be available by the time you read this, will ship with a QuickDraw-based driver and 50 TrueType fonts.

In the end, however, the leaders in the thermal-wax world are the firms that have worked for years to pioneer and popular-

ize this technology: Tektronix—with innovative engines, color-matching software, and fast controllers—would have been an Editors' Choice if it hadn't been in the middle of a product-line shift during our testing period. QMS, with excellent output quality and sophisticated Crown architecture; and Seiko, with fast controllers and reasonable prices, are also superb values. **m**

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Macworld Lab testing supervised by MARK HURLLOW.

MW

EDITORS' CHOICE

Personal ColorPoint PSE This unit offers the lowest price of any 300-dpi thermal-wax machine. Its enhanced screening delivers remarkably sharp prints of scanned images, and the technical support is excellent.
Company: Seiko Instruments. **List price:** \$2999.

ColorScript 210 Offering plain-paper support and the sophisticated Crown printer-architecture, this machine is a good choice for workgroup printing. A forthcoming controller upgrade promises improved halftones, too.
Company: QMS. **List price:** \$4995.

Dye-Sublimati

Photographic-quality printing finally becom

FOR PHOTO-REALISTIC results, you want a dye-sublimation printer. Unlike ink-jet and thermal-wax machines, dye-sub printers mix cyan, magenta, yellow, and black pigments to create any of 16.7 million hues without dithering. Dye-sub images are free of dot patterns that obscure details and destroy realism. And as Macworld Lab tests of eight units show, the benefits of healthy competition—lower prices and higher quality—have finally hit the dye-sub market.

Photo-realistic results make dye-sub the preferred printers for proofing color publications. Dye-sub is also the natural output choice for the growing field of electronic photography. The special paper that dye-sublimation machines use has a glossy finish that closely resembles photographic paper. Dye-sub printers' dither-free output is also well suited to scientific and medical imaging, where every detail counts.

Dye-sub printers also work with transparency film and do a beautiful job with the flashy graduated backgrounds that Aldus Persuasion and Microsoft PowerPoint provide. Ink-jet and thermal-wax printers must use dither patterns to simulate graduated fills (areas where one color blends into another), but dye-sub printers produce the continuous color blends that appear on the Mac's screen.

But the very qualities that make dye-sub machines so adept at printing continuous-tone images impair their ability to print sharp text. Text from a dye-sub

machine sometimes looks fuzzy—like a slightly misfocused photograph. Large type, such as the 18- or 24-point text you might use in an overhead transparency, doesn't look bad, but small sizes can be difficult to read. If you work more with small text sizes and spot colors than with scanned images and graduated fills, you probably want a thermal-wax machine (see "Thermal-Wax," in this issue). Besides being able to print on plain paper, you'll pay less.

A lot less. Prices have dropped in the past year, but dye-sub printers remain among the most expensive color printers. The eight machines reviewed here range from \$6995 for Nikon's CP-3000D Full Color Printer to \$24,895 for Kodak's XLT 7720 Digital Continuous with most retailing for around \$10,000.

Dye-sub printers also cost more to operate. A page from an ink-jet or thermal-wax machine generally runs between 50 cents and a dollar; most dye-sub prints cost several dollars each. But against photographs—a closer comparison from the quality standpoint—dye sublimation looks almost reasonable in cost, especially considering that chemicals and dark-room work are not needed.

How Dye-Sub Printers Work

DYE-SUBLIMATION (ALSO CALLED *DYE-DIFFUSION*) printers closely resemble thermal-wax machines. Both types of printers use ribbons containing successive panels of cyan, magenta, yellow, and, optionally, black pigment. In both, a print head transfers pigment from the ribbon to the

page. The paper shuttles into and out of the print engine once for every process color—cyan, magenta, yellow, and black.

The key differences between thermal-wax and dye-sub printers are the type of paper, the composition of the color pigments, and the way the print head applies the pigments. As the technology's name implies, dye-sub pigments are not inks. Inks rest on top of the print medium; dyes permeate the surface. When a heated element in the dye-sub machine's print head contacts the dye ribbon, the dye *sublimates*—turns from a solid into a gas, with no liquid phase in between. The gaseous dyes are absorbed by the polyester coating on the paper. Inks are opaque and must be printed in various dither patterns to fool the eye into seeing various colors. Dyes are transparent, so a dye-sub printer creates a given color by applying dots of the process colors directly on top of one another. And a dye-sub print head varies the temperature of its heating elements to apply pigments in unequal amounts—say, a lot of yellow and just a tad of cyan. There are none of the dot patterns, or rosettes, that are the building blocks of color halftones. This lack of dot patterns is one of the factors that make dye-sub output look like a photographic print. This extra sophistication also contributes to dye-sub's higher cost.

As the paper absorbs the dyes, they diffuse, so rather than having a sharply defined edge, each dot is slightly fuzzy. This diffusion helps the dots blend and contributes to the printer's ability to produce continuous-tone images.

by Jim Heid

on

es affordable

Quality Concerns

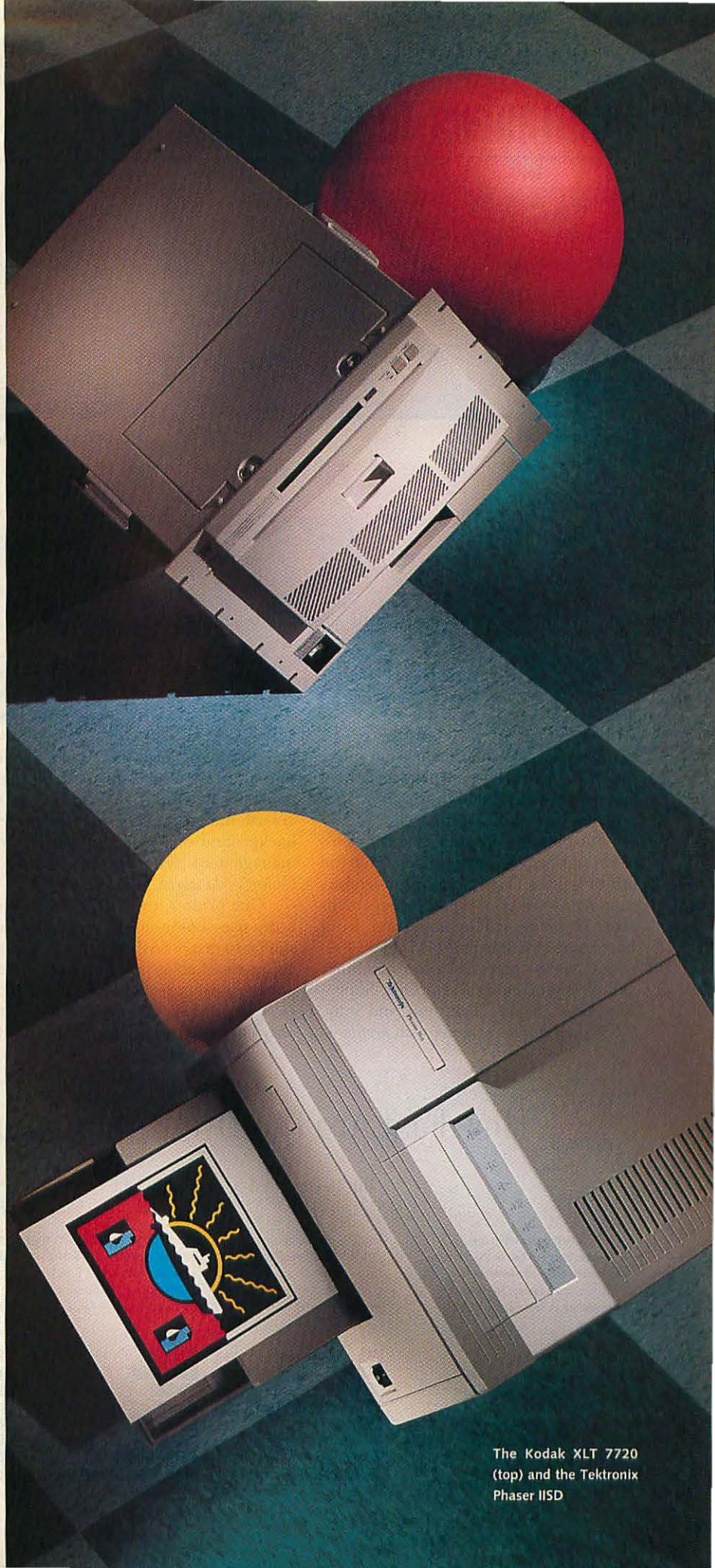
BUT SOFT-EDGED DOTS CAN CAUSE small text and line art to look blurred. Under magnification it's apparent that the dyes diffuse to a greater extent along the axis of paper movement—just as a raindrop hitting a moving car's windshield spreads more in one direction than in others. One printer, Tektronix's Phaser IISD, compensates for this by adjusting the amount of dye applied using the Tektronix Photofine technology. The technique helps: the Phaser IISD produced some of the best-looking text of the printers tested.

Some printers turn their soft-edged dots into weapons against the stair-stepped jagged edges that are common artifacts in line art and large text. Several models provide a text *antialiasing* option that fills jaggies with subtle shades of intermediate color values.

As you scan the specifications in "Dye-Sublimation Features," you may notice that output resolution varies in this category—from 163 dots per inch for the Sony UP-D7000 to 300 dpi for most other printers. For printing text or line art, the standard resolution rule applies—the more dots per inch, the better. For scanned or video-captured images, however, images printed by the 163-dpi Sony UP-D7000 looked as sharp as those produced by the 300-dpi printers.

The weight of the paper also affects the look and feel of dye-sub output. The printers from GCC Technologies, RasterOps, and Tektronix use a lighter-weight paper than do the Sony, SuperMac Technology (which we examined in a pre-release version), 3M, Eastman Kodak, and Mitsubishi machines, which use a so-called high-opacity paper whose weight more closely resembles that of photo-

PHOTOGRAPH BY MARK JOHANN/ILLUSTRATION BY MARK FOX



The Kodak XLT 7720 (top) and the Tektronix Phaser IISD

Continuous-Tone Clarity



Kodak XLT 7720



GCC Technologies ColorTone



3M Rainbow



RasterOps CorrectPrint 300i

graphic paper. Besides feeling more like the prints publishers or photographers may be used to, the high-opacity paper provides better color saturation.

For prepress proofing, the dye-sub's colors must closely match colors from the printing press. Therefore, most vendors support a variety of color-management schemes. The Eficolor system from Electronics for Imaging (415/742-3400) is popular for prepress color matching, and is supported by RasterOps, SuperMac, GCC, Kodak, Tektronix, and Sony. GCC provides its printers with *profiles*—

descriptions of the printers' color-rendering abilities—for Apple's ColorSync matching system, while Tektronix printers use the proprietary technology. (For background on these and other color-management systems, see "Managing Color," *Macworld*, January 1993.)

One printer, the \$19,500 3M Rainbow, uses color-matching technology similar to that of 3M's Matchprint system, a film-based color proofing system. Supporting a paper size of 17.2 by 11.8 inches (super B size), the 3M Rainbow is the only currently shipping dye-sub printer

that can produce tabloid-size output with bleeds. (SuperMac's ProofPositive Two-Page Printer should join it by the time you read this.) The Rainbow is also the only printer that can directly print desktop color-separation (DCS) files along with any traps and overprints specified in them. Prints cost about \$7 each, while Matchprints can run \$50 or more.

Controllers and Connectors

IN THE THERMAL-WAX WORLD, THE VAST majority of printers provide network ports and built-in PostScript controllers.



How Fast Are the Dye-Sublimation Printers?

= Fastest result in test. Shorter bars are better. Products are listed in order of overall performance, from fastest to slowest. Times are in seconds.

Object-Oriented Graphic

Print speed for a complex color MacDraw Pro document with more than 840 color objects, most of them gradient-filled.

PostScript Graphic

Print speed for graphics that include special PostScript effects. We used a FreeHand illustration with nonlinear blends and Bézier curves.

Presentation Graphic

Print speed for a PowerPoint transparency with a color gradient background and several lines of text in the Times font.

Scanned Image

Print speed for a 910K, 72-dpi, 9 1/2-by-6 1/2-inch scanned Photoshop image with many shadow details.

Sony UP-D7000
GCC Technologies ColorTone
Mitsubishi Intl. ColorStream/DS
Kodak XLT 7720
RasterOps CorrectPrint 300i
Tektronix Phaser IISD
Mitsubishi S3600-3OU
3M Rainbow

393
694
791
2369
871
720
1205
1727

235
682
494
413
634
571
844
1363

177
382
305
288
347
477
481
513

216
292
365
259
514
732
915
611



Mitsubishi International ColorStream/DS



Original



Tektronix Phaser IISD



Mitsubishi Electronics America S3600-3OU

Unlike ink-jet and thermal-wax printers, which use dot patterns to represent different shades, dye-sublimation printers mix colors. This yields smooth, continuous-tone images. Compared against the original (top right), the Mitsubishi International ColorStream/DS (this page, top left) shows particularly good color fidelity. See, for example, the difficult-to-render green in "Honderd." In contrast, the Mitsubishi Electronics America S3600-3OU (this page, middle right) unduly lightens all the colors. Only the Sony UP-D7000 (this page, bottom), a 163-dpi unit, shows banding, as seen on the man's face.



Sony UP-D7000

There's a greater variety of connector and controller schemes in the dye-sub field because of the need to move the vast amounts of data present in scanned images from the Mac to the printer as quickly as possible, and because some vendors want more-flexible alternatives to conventional PostScript interpreters.

A LocalTalk network is a bottleneck for printing scanned images; even Ethernet can be inadequate for large files. Besides slowing printing, sending huge scanned images over a network slows down any file servers and electronic-mail systems on the same network. Therefore, printers from 3M, Seiko, Nikon, Sharp, Kodak, and Sony connect to the Mac's SCSI port, which provides the fastest data-transfer rates. These machines also provide print-server software that enables other Macs on a LocalTalk or Ethernet network to print, albeit with those networks' performance limitations.

As for controllers, GCC, Mitsubishi, Tektronix, RasterOps, and Sharp (in the JX-7000PS only) provide built-in Post-

Script-compatible controllers. The 3M Rainbow uses Adobe's software-based PostScript, called CPSI—configurable PostScript interpreter (see "How to Buy a Color Printer," this issue). Because CPSI runs on the Mac, this printer's performance depends on the speed of the Mac it's connected to—and the printer slows down the Mac while printing. You can speed up CPSI-based units (and, for that matter, printers that use PostScript emulators or QuickDraw) by upgrading the host Mac's memory and processor—though this can be a costly option. A service bureau or publishing house should use a Quadra or accelerated Mac II-family machine.

The Sony UP-D7000 and Kodak XLT 7720 Digital Continuous include QuickDraw-based drivers as well as Photoshop export modules that let you print Photoshop images without using the printer's driver. Printing through the export module is generally faster than using the printer's Chooser driver, since

Photoshop has already divided the image into the red, green, and blue components the printer requires. 3M's Rainbow also includes a Photoshop export module, as will SuperMac's ProofPositive.

In the ease-of-use department, GCC Technologies' ColorTone deserves special mention for its oversize front-panel liquid crystal display that displays status messages and options from a well-designed menu system. The ColorTone's controller also includes a built-in hard drive, a SCSI port for an external hard drive, and a built-in Ethernet connector. The internal hard drive also contains the PhoenixPage interpreter, so you can upgrade the interpreter without swapping ROM chips—just download the new software to the printer's hard drive.

Performance and Picks

THE OVERALL PERFORMANCE LEADER IN Macworld Lab tests was Sony's Quick-

Calibration Can Improve Color Fidelity

To get the most out of dye-sublimation, consider using a color-management system. Compared with the original image (middle), standard output from the Kodak XLT 7720 (left) shows an overabundance of yellow, particularly noticeable in the building's thatched roof. After the printer was calibrated using the Kodak ColorSense color-management system, the new output (right) closely duplicates the original, except for the unduly blue cast added to the circular shape at the right side of the image.

Draw-based UP-D7000, thanks in part to its 163-dpi resolution. (The Mac works harder with more dots to print.) Among 300-dpi printers, GCC's ColorTone took first place, followed by Mitsubishi's ColorStream/DS. These machines' controllers have fast processors—AMD29050 RISC chips. The slowest Photoshop performer was Mitsubishi's S3600-3OU equipped with the Q-Script controller.

Which printer to buy? At the low end—if you can call \$8995 low—it's hard to beat Sony's UP-D7000 for electronic photography. It's fast, and Sony's high-opacity paper produces vivid prints with a photographic look-and-feel. The UP-D7000 is also among the most compact printers tested—it looks like an oversize video recorder. The UP-D7000 is not a good choice for prepress proofing, how-

ever. Its 163-dpi resolution hampers text quality, and by the time you buy the \$1495 Freedom of Press Professional PostScript emulator from ColorAge (508/667-8585) you need, you've spent as much as a 300-dpi PostScript dye-sub machine costs.

If you don't need letter-size prints, you might evaluate Nikon's CP-3000D, which retails for \$6995 and produces 5-by-7-inch prints. We didn't test this 203-dpi, QuickDraw-based machine, which includes a Photoshop export module.

If you need built-in PostScript and you can spend a few thousand dollars



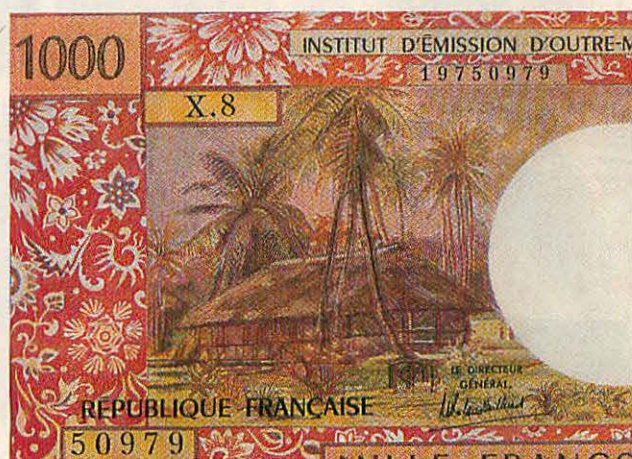
Before calibration

more, consider GCC's ColorTone, Mitsubishi's ColorStream/DS, or Tektronix's Phaser IISD. The ColorStream/DS's high-opacity paper yields excellent results, and at \$9950, it's also the least expensive of the top three. Still, the GCC ColorTone, with its full complement of ports and internal 100MB hard drive, is a great overall value at \$10,999. (The \$9995 Sharp JX-7000PS, not tested, is also worth checking; it offers a built-in 80MB

DYE-SUBLIMATION FEATURES

Company	Phone	Product	Tested by Macworld Lab	Price	Standard Ports/ Optional Ports/ All Active	RAM (base model/ maximum)	Resolution (in dots per inch)	Page- Description Language
3M Company	612/736-3481, 800/362-3455	3M Rainbow	yes	\$19,500	SCSI/1/NA	8MB/8MB	300	Adobe Level 1 (CPSI)
Eastman Kodak Company	716/781-9264, 800/445-6325, ext. 130	Kodak XLT 7720 Digital Continuous	yes	\$24,895 ²	SCSI/none/NA	12MB/12MB	203	QuickDraw
GCC Technologies	617/275-5800, 800/422-7777	ColorTone	yes	\$10,999	E, L, P, S/NA/yes	16MB/64MB	300	PhoenixPage Level 1 ³
Mitsubishi Electronics America	800/733-8439	S3600-3OU ⁴	yes	\$12,995	L, P, S/E/yes	46MB/74MB	300	PowerPage Level 1
Mitsubishi International Corporation	914/997-4999	ColorStream/DS	yes	\$9950	L, P, S/E/yes	14MB/38MB	300	Pipeline PowerPage
Nikon Electric Imaging	516/547-4355, 800/526-4566	CP-3000D Full Color Printer	no	\$6995	GPB, P, SCSI/ NA/no	4MB/4MB	203	QuickDraw
RasterOps Corporation	408/562-4200, 800/729-2050	RasterOps CorrectPrint 300i	yes	\$9999	E, L, S/NA/no	36MB/48MB	300	RIPS Level 1
Seiko Instruments USA	408/922-5800, 800/888-0817	Professional ColorPoint PSH	no	\$9999	L, P, S, SCSI/E, N/yes	16MB/64MB	300	Seiko Page Level 1
Sharp Electronics Corporation	201/529-9593, 800/237-4277	JX-7000 JX-7000PS	no	\$7500 \$9995	SCSI/NA/NA E, L, S/NA/no	8MB/32MB 16MB/48MB	300	QuickDraw PhoenixPage Level 1
Sony Corporation of America	201/930-6576, 800/472-7669	UP-D7000 Digital Color Printer	yes	\$8995	SCSI/NA/NA	9.4MB/9.4MB	163	QuickDraw
Tektronix	503/682-7377, 800/853-6100	Phaser IISD Color Printer	yes	\$9995	L, P, S/E, T/yes	16MB/64MB	300	Adobe Level 2

E = Ethernet; L = LocalTalk; N = Novell NetWare; P = parallel; S = serial. Technical support ratings are based on a series of calls made to each company by Macworld staffers. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only those printer. ² Version that does not print transparencies costs \$19,995. ³ PhoenixPage Level 2 to be available summer 1993. ⁴ B-size, QuickDraw printer also available.



Original



After calibration

hard drive and an Ethernet port.)

The Phaser IISD is slower than the ColorStream/DS and the ColorTone, but provides true Adobe PostScript, Tektronix's TekColor color-management system, and the Photofine technology, which sharpens text and line art. At \$9995, the Phaser IISD also retails for \$1004 less than the ColorTone, although the IISD doesn't include an internal hard drive or an Ethernet port. In our survey,

Tektronix technical support was best, followed by GCC and Kodak.

At the high end, both the 3M Rainbow and the Kodak XLT 7720 are superb printers. The Rainbow has the edge in paper size and overall sophistication, with its Adobe CPSI interpreter and ability to print DCS files. But the XLT 7720 produces stunning results through its QuickDraw driver and its Photoshop export module (many PostScript options are

available from third parties). In all, the Rainbow is the better choice for prepress proofing, while the XLT 7720 is the less-expensive alternative for electronic photography and imaging applications.

With Kodak's Photo CD and Apple's QuickTime fueling the trend toward electronic imaging, dye-sub printers have the potential to be the most popular type of color printer—if only they weren't so expensive. Prices are likely to drop in the next year or two as the market and competition heat up, but don't expect the kind of price-tag free-fall that the last year brought. If you need a dye-sub printer, now is a good time to buy. **m**

Contributing editor JIM HEID is coauthor (with Peter Norton) of *Inside the Apple Macintosh* (Brady, 1992) and author of *Macworld Complete Mac Handbook* (IDG Books Worldwide, 1992).

Macworld Lab testing supervised by MARK HURLLOW.

Processor/ Clock Rate	SCSI Port for Font Storage	Number of Fonts	Text Antialiasing	Paper Sizes	Technical Support
NA/NA	NA	13	no	SB, A, A4	NA
varies/varies	NA	0	yes	A, A4, 11" x 11"	very good
AMD29050/ 25MHz	yes	35	yes	A, A4, lgl, SA4	very good
AMD29000/ 20MHz	yes	35	yes	A, A4, lgl, SA4	good
AMD29050/ 25MHz	yes	35	yes	A, SA	good
68020/ 16MHz	no	0	no	A5	NA
LSI R33000/ 33MHz	yes	35	yes	A, A4, lgl, SA4	poor
Weitek 8220/ 25MHz	yes	39	yes	A, A4, lgl, A4 lgl, Br	NA
NA/NA	no	0	no	A	NA
not disclosed/33MHz	yes	35	no	A, lgl	NA
varies/varies	no	0	yes	A, A4	good
AMD29000/ 24MHz	yes	39	no	A, A4, lgl, SA4	excellent

(posing as customers) to gauge the accessibility, helpfulness, and accuracy of the company's support technicians. companies whose products Macworld Lab tests. * Any interface available to host Mac becomes available to

MW

EDITORS' CHOICE

ColorStream/DS One of the fastest printers reviewed here, the ColorStream/DS produces beautiful results on its high-opacity paper, although small text is a bit fuzzy. The ColorStream/DS is also the least expensive of the top machines tested. **Company:** Mitsubishi International. **List price:** \$9950.

Phaser IISD Color Printer Boasting Adobe Level 2 PostScript, Tektronix's Photofine text-enhancement technology, and TekColor image-enhancement technologies, the Phaser IISD is an excellent choice for presenter and publisher alike. **Company:** Tektronix. **List price:** \$9995.



Editors' Choices Elsa asked Sam to play it again, for old times' sake, and everyone knows what happened. Macworld Lab has tested monochrome monitors again, not for old times' sake but for our readers' edification, and the result is an Editors' Choice list that includes Sigma Designs' SilverView Pro (upper left), Mobius Technologies' MD 202 Two Page Display (upper right), and Mirror Technologies' 15-Inch Gray Scale Portrait Display (bottom).

Here's Looking at

MONOCHROME MONITORS

Macworld Lab tests 25 displays of all sizes

It may be true that a kiss is just a kiss and a sigh is just a sigh, but when it comes to purchasing a monitor, things are not quite so simple. You must decide between monochrome (whether black-and-white or gray-scale) and color, evaluate a wide array of products, measure price versus quality, and finally, determine the best alternative.

To help those who are in the market for a monochrome monitor, Macworld Lab decided to round up the usual suspects—25 monitor-and-board systems from 9 vendors—and put them through their paces with a series of measurement tests; a panel of Macworld editors conducted a series of complementary perceptual tests. We also tested monitors that are sold without video-display boards if they work with a Mac's built-in video, since all new Macs come with built-in video. Armed with these results, you won't be misinformed (unlike Rick Blain, who went to Casablanca for the waters) and will be able to make an intelligent purchasing decision.

We tested systems, as opposed to just monitors or just boards, because most large-screen manufacturers design their monitors with a specific video-display board in mind, and they frequently sell the two as a bundle, often at a better price than if purchased separately. Many users prefer the simplicity of this sort of one-stop shopping.

Overall, our measurements and perceptual tests show that the quality level of monochrome systems is high. We have our favorites, of course (unlike Rick, we're not completely neutral about everything), but, with a few exceptions, we feel we'd be in pretty good shape with just about any of the monitors reviewed here.

On This You Can Rely

WHY BUY A MONOCHROME MONITOR WHEN EVERYONE SEEMS TO BE SO ENAMORED of color displays? For one thing, while Ilsa Lund may be willing to be overcharged, you shouldn't be so sanguine. Color is expensive—considerably more expensive than the cost of a comparable monochrome system. Also, images displayed on monochrome monitors tend to be sharper—and thus the text clearer—than on color monitors. If you work mostly with words and numbers, the purchase of a color monitor could well be something you come to regret; maybe not today, maybe not tomorrow, but soon, as your eyes tire from reading less-than-perfect text.

Of course, on a monochrome monitor you won't be able to tell that the Germans wore gray and Ilsa wore blue or whether Rick's eyes are really brown. But in a monochrome world, you can place a scarlet macaw in an exterior shot of the Blue Parrot Bar and no one will be the wiser.

As for black-and-white versus gray-scale, the choice depends on the tasks to be performed. Rick's Café Américain was closed by the *préfet de police*, but if it were still in

by Robert C. Eckhardt



Portrait Displays Rick took no chances, not even with his friend Captain Renault. You won't be taking any chances, either, if you choose Radius's Pivot Display (left), one of *Macworld's* favorites, or the MD 102 One Page Display from Mobius Technologies (right).

operation, I'd recommend a black-and-white display for a letter writer and number cruncher like Carl, the waiter/bookkeeper. Black-and-white displays are cheaper, their text is as good as it gets, and they are faster and more responsive than gray-scale (or color) displays.

Editing scanned photos, creating many kinds of PostScript art, and previewing color art in monochrome all require a monitor that can display as many as 256 shades of gray. Thus, for the Café Américain graphics department, I'd recommend spending more to have a gray-scale monitor. For anyone who spends most of the day working with large gray-scale images, I'd also consider the purchase of a video-display board that includes acceleration. Although most such boards are designed for use with color monitors, they work well with gray-scale monitors, too. For 256 shades of gray, an 8-bit board is sufficient (don't buy a 24-bit board thinking you'll get even more levels of gray—gray scale doesn't get any better than 256 shades).

It's Not the Same Old Story

IN THE LAST TWO YEARS, A MAJOR change has complicated the marriage of monitor and video-display board: most Macs since the IIsi now contain built-in video circuitry (on-board video) that can handle 15-inch and larger monitors. With these Macs, you can attach compatible monitors directly to the video port. You don't have to buy and install a separate

video board (although you can if you want). With the built-in video, you get 16 or more levels of gray, depending on the configuration (see "How Many Grays Does Your Mac Support?").

But just as Ilsa faced important trade-offs between taking the plane to Lisbon with Victor or staying in Casablanca with Rick, there are trade-offs between using built-in video and installing a separate video-display board. You paid for built-in video when you bought the Mac and there's no need to open the system unit and install a board. But built-in video is slower than a separate video board (more so with graphics than with text), especially in the PowerBooks, the IIsi, and IIfx, so it may be a false economy.

There's Something You Should Know

MONOCHROME DISPLAY SYSTEMS FALL into four groups. The first cut separates black-and-white from gray-scale. Each of these two groups can then be divided according to the size of the monitor: portrait displays and two-page displays.

Small Display The one exception to this size scheme is Apple's Macintosh 12" Monochrome Display, a low-cost landscape monitor with the same 640-by-480-pixel resolution as that of a standard 14-inch color monitor. Now, we don't mind an inexpensive monitor (which this one decidedly is), but we do object to a cut-rate one. This monitor failed our perceptual tests for sharpness, has a strong blue cast that makes it appear especially dim,

and displays about half the area of a portrait monitor. Thus we don't recommend the Apple 12-inch monitor to anyone intending to work long hours at the computer. But its rock-bottom price makes it appropriate on a server whose monitor is viewed only rarely.

Portrait Displays Virtually all portrait displays display 640 by 870 pixels, just big enough for a standard, letter-size page. The only exception is Sigma Designs' SilverView Portrait, which we cover in the section on two-page gray-scale displays. It displays 870 by 1152 pixels, which is about the size of a tabloid page (11 inches by 17 inches). Portrait monitors are ideal for wordsmiths who want to see as much text as possible at one time, yet don't want the inconvenience or expense of a big screen. But portrait monitors should be avoided by those whose visual domain tends to be horizontal (landscape-oriented graphics or two-page spreads, for example).

A marked contrast to most monitors' fixed orientations is the Radius Pivot Display, which can be run either as a portrait monitor or as a small landscape monitor.

Two-Page Displays Despite their name, most two-page monitors cannot display two full pages side by side. A 19-inch monitor usually displays an area of 1024 by 768 pixels (which crops about an inch off the top and bottom and two inches on each side of a full two pages); a 21-inch monitor usually displays 1152 by 870 pixels (which crops about an inch right and left).

Despite the misnomer, two-page displays are prized by spreadsheet artists (who tend to accumulate columns faster

HOW MANY GRAYS DOES YOUR MAC SUPPORT?

Macintosh	Portrait Displays (640 by 870 pixels)	Two-Page Displays (up to 1152 by 870 pixels)
Centris 610, 650 *	16	16
Centris 610, 650 †	256	256
IIsi, IIfx	16	†
IIfx	256	†
LC III *	16	†
LC III †	256	†
PowerBook 160, 180	256	†
PowerBook Duo 210, 230	256	†
Quadra 700 *	16	16
Quadra 700 †	256	256
Quadra 800, 900, 950	256	256

* With base amount (512K) of VRAM. † With VRAM expansion. ‡ Monitor size not supported; video-display board is required.

than rows) and graphic designers (especially those who work with double spreads or large graphics) almost as highly as letters of transit were valued by Casablanca's transient population.

In two display systems—Sigma Designs' MultiMode 120 and L-View MultiMode—you can change the pixel density of the display, which in essence lets you zoom in or out. Both systems let you select any of six pixel densities from 36 dpi to 120 dpi (with six corresponding pixel dimensions, from 512 by 384 to 1664 by 1200 pixels), which is a little like choosing from among the large-type, standard, and microfiche editions of *Reader's Digest*. Conveniently, you can change pixel density on these two monitors as you work, without restarting the Mac, which is handy if you are editing text but occasionally want to zoom out to preview how the text fits in its two-page spread, or if you want to use a large monitor in a presentation.

Black-and-White Portrait Displays

MACWORLD LAB TESTED NINE portrait displays; three of these we tested as black-and-white monitors: the Lapis Technologies Full Page Display, Mirror Technologies 15-Inch Gray Scale Portrait Display, and Mobius Technologies One Page Display (sold in two versions, one that uses built-in video, and one that requires a video-display board). With the appropriate third-party video-display board, the Mirror monitor can display gray scale.

The Mirror portrait monitor has a paper-white screen phosphor. Phosphors in the other two are bluish. The Mobius and Mirror monitors are distinctly brighter than the Lapis monitor in both measurement and perceptual tests (see "Monochrome Monitor Quality"). Measurement tests of contrast placed the Mobius and Lapis monitors at the top, while in tests of perceived contrast, the panel again preferred the Mobius and the Mirror monitors. Lab tests for distortion ranked the Mobius monitor the best; the Lapis monitor shows a slightly—but not significantly—greater departure from the straight and narrow.

The human eye is one of the best and most reliable instruments for measuring sharpness and focus. Our panel of editors thus cast a wary eye toward the four

black-and-white portrait monitors and judged the Mirror monitor to be the best, with sharp focus over the entire screen. The panel rated the Mobius monitor second best (it is slightly out of focus on the edges), and the Lapis third.

Flat screens are a big plus in portrait displays—the more a screen curves, the more the images it displays appear to be falling over backward—and the Mobius screen is about as flat as they come. The other two portrait displays have slightly curved screens.

favorite black-and-white portrait system is the Mirror display; the Mobius One Page comes in a close second.

Gray-Scale Portrait Displays

MACWORLD LAB TESTED SIX GRAY-scale portrait displays: the Apple Macintosh Portrait Display, Lapis Technologies Full Page Gray Scale Display, Radius Full Page Display System and Pivot Display, RasterOps Monochrome/Gray Scale Portrait Monitor, and Sigma Designs PageView GS. The PageView is the only such



Two-Page Displays While Victor was completing arrangements for the Lisbon plane, Rick told Ilsa that he had a job to do, alone. You have a job to do, too, but it requires a video-display partner. If you need a two-page display, consider teaming up with Sigma Designs' L-View MultiMode (right) or the pricier MultiMode 120 (left), both of which are on the Editors' Choice list, or SuperMac's Platinum 20 Full-Page Display (center).

The Mobius has the power switch and brightness and contrast controls on the side. The other two monitors all have the power switch and brightness control placed more conveniently on the front, but like Captain Renault, we were shocked, shocked to discover that their contrast control is at the back and requires a screwdriver. None of the three let you set the brightness greater than the optimum level. That's too bad, because as time goes by, the screen phosphor ages and brightness tends to decline. If the brightness control can be turned up higher than the current optimal setting, you can compensate for the monitor's natural aging. If the monitor must be set at optimum brightness from day one, you can't compensate later on. Overall, the panel's

monitor we tested using built-in video, which it requires; we ran it with a Mac Ili, which can generate only 16 gray levels. The Apple Portrait was tested with an Apple video-display board, since discontinued in favor of built-in video, that generates only 4 shades of gray. Used with built-in video, the monitor produces up to 256 gray shades. We tested it at both 4 and 256 gray shades.

The phosphor color of all six monitors is on the blue side. All are relatively bright (the Sigma PageView and Lapis Full Page somewhat less so than the Apple Portrait) with good contrast. Only the Lapis and RasterOps monitors let you adjust brightness above the optimal position. Distortion is acceptably low (lowest in the PageView), and the Sigma Page-

View and Apple Portrait have the flattest screens. The Apple Portrait did only fairly in the sharpness test (the entire screen appears to be slightly out of focus); focus on the PageView is a problem toward the bottom of the screen. The RasterOps is slightly blurry all over.

In their ability to clearly distinguish a full range of gray levels, the Sigma PageView and Radius Pivot top the list in both measurement (gray linearity) and perceptual tests. The Lapis Full Page fares poorly in the gray-scale linearity test and received harsh criticism from the panel for a very apparent inability to separate midtones. The Apple Portrait falls squarely in between.

Controls on the Sigma PageView are the most convenient (all three are out front). On the Apple Portrait, brightness and contrast are on the side and the power control is on the back. The Lapis Full Page has the power control on the front, brightness on the side, and, inexcusably, the contrast control is on the back and requires a screwdriver.

Overall, the review panel rated the Radius monitors as the best of the gray-scale portrait displays. In the panel's opinion, however, even the Radius monitors are not up to the standards of the best-rated two-page gray-scale displays. Thus, if you need gray scale and can afford the additional expense, or if your Macintosh

does not have built-in video, we suggest that you skip the portrait displays and purchase one of the recommended two-page systems instead. Otherwise, go for either of the Radius monitors.

Black-and-White Two-Page Displays

WE TESTED FOUR BLACK-AND-WHITE two-page systems: Mirror's 19-Inch Two Page Display and 21-Inch Gray Scale Display, Mobius Technologies' MD 202 Two Page Display, and Sigma Designs' L-View MultiMode. (The 21-inch Mirror monitor we tested came with a black-and-white video-display board; a gray-scale board is also available.)

The phosphor color of the Mobius

MONOCHROME DISPLAYS COMPARED

Company	Product	Tested by Macworld Lab	Monitor List Price	Supports Mac Built-in Video *	8-Bit Video Board List Price	Non-NuBus Macintoshes Supported by Video Board †
SMALL DISPLAYS						
Apple Computer	Macintosh 12" Monochrome Display	●	\$245	●	\$569	none
PORTRAIT DISPLAYS						
Apple Computer	Macintosh Portrait Display	●	\$889	●	\$569	none
Hardware That Fits	RealTech 15" Full Page Display	○	\$449	●	\$429	SE, SE/30, LC series
Lapis Technologies	Full Page Display	●	\$599	○	\$299	SE/30, LC series
	Full Page Gray Scale Display	●	\$799	●	\$499	SE/30, LC series
MacProducts USA	Panasonic M1500	○	\$150	○	\$299 ‡	none
Mirror Technologies	15-Inch Gray Scale Portrait Display	●	\$399	●	\$299 ** #	SE, SE/30, LC series
Mobius Technologies	MD 102 One Page Display ††	●	\$499	○	\$199 **	Classic, SE, SE/30, LC series
Radius	Full Page Display System	●	\$699	●	\$459	Classic, SE, LC series, IISI, IISI, Centris series, Quadra series
	Pivot Display	●	\$849	●	\$299	Classic, SE/30
RasterOps Corporation	15" Monochrome/Gray Scale Portrait Monitor	●	\$649	● ‡‡	\$579 to \$699 † ‡ ‡	Classic, LC series
Sigma Designs	PageView GS	●	\$599	●	†††	†††
TWO-PAGE DISPLAYS						
Lapis Technologies	Two Page Display	●	\$1049	○	\$499 † †	SE, SE/30, LC series
MacProducts USA	Panasonic M1900	○	\$299	○	\$299 ‡	none
Mirror Technologies	19-Inch Two Page Display	●	\$799	○	†††	SE, SE/30
	21-Inch Gray Scale Display	●	\$999	● ‡‡	\$299 ** #	none
Mobius Technologies	MD 202 Two Page Display	●	\$699	○	\$199 ** #	Classic, SE, SE/30, LC series, IISI
Nanao USA Corporation	FlexScan 6500	○	\$1899	●	†††	†††
Radius	Two Page Display/19	●	\$1099	●	\$599 † †	SE, SE/30
	Two Page Display/21	●	\$1399	●	\$599 † †	SE, SE/30
	Two Page Display 21/E	○	\$1599	●	\$599 † †	SE, SE/30
RasterOps Corporation	21" Monochrome/Gray Scale Monitor	●	\$1299	●	\$579 † †	Classic
Relax Technology	Ikegami DM2010	○	\$799	○	\$200 ‡‡‡	SE/30, LC series
	Sampo OfficePro IIa	●	\$599	○	\$200 ‡‡‡	SE/30, LC series
Sigma Designs	L-View MultiMode	●	\$1099	○	\$299	SE, SE/30, LC series
	MultiMode 120	●	\$1099	○	\$1299	none
	SilverView Portrait	●	\$1299	○	\$799	none
	SilverView Pro	●	\$1299	●	\$549	SE/30
SuperMac Technology	Platinum 20 Full-Page Display	●	\$1099	●	\$499 † †	LC series
	Platinum 21 Two-Page Display	●	\$1199	● ‡‡‡	\$499 † †	LC series

● = yes; ○ = no; NA = not applicable. Technical-support ratings are based on a series of calls made to each company by Macworld staffers (posing as customers) to gauge the accessibility, helpfulness, and accuracy of the company's support technicians. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only

those companies whose products Macworld Lab tests. * For portraits, this includes the Quadras, PowerBooks 160 and 180, and PowerBook Duos with docking stations, unless noted. For two-page displays, this includes only the Quadras and PowerBook Duos with docking stations, unless noted. † All boards may be installed in Macs with a NuBus slot.

‡ B&W indicates a black-and-white monitor; Quadra 700 supports only 16 levels of gray with standard amount of video RAM. ‡ Supports only 16 levels of gray on LC and LC II. † Company does not provide technical support. # Board is 1-bit. ** Price is lower if purchased with monitor.

and Mirror monitors is on the blue side (the 21-inch Mirror monitor decidedly so), while the color of the Sigma L-View tends toward green. The Mirror 19-inch monitor is the brightest in both measurement and perceptual tests, while the Mirror 21-inch is the dimmest; the other two monitors fall about midway in between. None let you adjust brightness above the currently optimal position.

The Mirror 21-inch tops the list in contrast measurements, but because it is so dim its perceived contrast actually falls at the bottom of the list (alongside the Sigma L-View). Perceived contrast is best in the Mobius and Radius monitors and second best in the Mirror 19-inch.

The winner in the sharpness test is the Sigma L-View. Both Mirror monitors, on the other hand, are the losers here: the Mirror 19-inch monitor's screen appears slightly out of focus, and the Mirror and RasterOps 21-inch monitors' screens show subtle ghosts next to vertical lines, such as the vertical strokes of letters and numbers. In measurements of distortion, the Mirror 21-inch and the Sigma L-View monitors have the least; distortion is slightly greater in the other two monitors. Physically, the Mirror 21-inch monitor has the flattest screen; all the others display a slight curve.

Power, brightness, and contrast controls are all on the front of the Mobius

Does 72 dpi Matter?

The built-in monitors of the original compact Macs displayed 72 dots per inch, and hardware manufacturers used to adhere to this standard to ensure that what you saw on the screen precisely matched the size of the printed version. But manufacturing realities—and the fact that few people need or expect the size of an object on screen to correspond exactly to the printed result—have changed all that.

These days, the pixel densities of monitors (including Apple's) range from 72 dpi to 82 dpi; the higher the density, the more condensed the image. For most people, these pixel densities are not significantly different. When choosing a monitor, worry less about the dpi value itself and more about how the image feels to you when you view it.

Screen Diameter (in inches)	Active Screen Area (w x h, in inches)	Gray Levels ¹	Customer Contact: Toll	Customer Contact: Toll-Free	Technical-Support Rating
12	8.4 x 6.3	256 [§]	408/996-1010	none	"
15	8.0 x 10.9	256	408/996-1010	none	"
15	7.8 x 11.7	256	none	800/364-8737	NA
15	7.8 x 10.9	B&W	510/748-1600	800/435-2747	good
15	7.8 x 10.9	256	510/748-1600	800/435-2747	good
15	7.5 x 10.2	B&W	512/472-8881	800/622-3472	NA
15	8.0 x 10.9	B&W ^{††}	none	800/654-5294	good
15	8.2 x 11.0	B&W	510/654-0556	none	excellent
15	12.5 x 14.3	256	408/434-1010	800/227-2795	good
15	7.8 x 10.5	256	408/434-7010	800/227-2795	good
15	7.5 x 10.4	256 ^{***}	801/785-5750	800/729-2656	very good
15	8.0 x 10.7	256	510/770-0100	800/845-8086	good
19	13.8 x 10.8	256	510/748-1600	800/435-2747	good
19	16.7 x 13.7	B&W	512/472-8881	800/622-3472	NA
19	14.2 x 10.7	B&W	none	800/654-5294	good
21	15.0 x 11.3	256 ^{††}	none	800/654-5294	good
19	13.7 x 11.0	B&W	510/654-0556	none	excellent
19	15.4 x 11	256	310/325-5202	800/800-5202	NA
19	14.1 x 10.8	256	408/434-1010	800/227-2795	good
21	15.5 x 11.9	256	408/434-1010	800/227-2795	good
21	15.5 x 11.9	256	408/434-1010	800/227-2795	good
21	19.2 x 18.4	B&W ^{***}	801/785-5750	800/729-2656	very good
19	14.2 x 10.7	256	510/471-6112	none	poor
19	14.2 x 10.7	256	510/471-6112	none	poor
19	14.0 x 10.5	B&W	510/770-0100	800/845-8086	good
19	14.1 x 10.2	256	510/770-0100	800/845-8086	good
21	16.0 x 12.0	256	510/770-0100	800/845-8086	good
21	16.0 x 12.0	256	510/770-0100	800/845-8086	good
19	14.2 x 10.6	256	408/245-2202	800/334-3005	satisfactory
21	15.0 x 11.2	256	408/245-2202	800/334-3005	satisfactory

^{††} Gray scale available only with Mac built-in video or third-party board.

^{††} Also available in a version (MD 103) that supports only built-in video; MD 103 also tested by Macworld Lab.

^{§§} Supports only Quadra built-in video.

^{†††} Lower-cost black-and-white version is also available.

^{***} Price depends on Macintosh model that board is

designed for.

^{***} Supports only black-and-white on Classics.

^{†††} Works only with built-in video.

^{†††} Video-display board is included with monitor.

^{§§§} Price is for NuBus board; PDS board costs \$400.

^{§§§} Supports only Quadra 800 and 950 built-in video.

Two Page and the Radius monitors; they are on the side of the Mirror 21-inch. In the Sigma L-View, the power switch is on the side and the other controls on the front, while on the Mirror 19-inch, brightness and power are on the side (there is no contrast control).

Overall, panel members preferred the Mobius Two Page and the Sigma L-View, more or less in equal measure. Anyone on a budget will undoubtedly prefer the much less expensive Mobius Two Page. Even when you factor in street prices, the L-View is the most expensive of the four—its ability to change pixel densities is in part responsible for this—and for some people, its extra versatility may be worth the added expense. At the opposite extreme, panel members disliked the Mirror 21-inch monitor, and felt it would be a strain to have to work on this monitor for long periods of time.

Gray-Scale Two-Page Displays

GRAY-SCALE TWO-PAGE SYSTEMS MADE up the largest group tested, including Lapis's Two Page Display, Radius's Two Page Display/19 and Two Page Display/21, RasterOps' 21" Monochrome/Gray Scale Monitor, Sampo America's OfficePro IIa, Sigma Designs' MultiMode 120 and SilverView Pro, and SuperMac's Platinum 20 Full-Page Display and Platinum 21 Two-Page Display. (The Sampo monitor is sold by Relax Technology and other direct sellers.) We also include the tabloid-size Sigma Designs SilverView Portrait in this group since it has more in common with these monitors than with

MW

EDITORS' CHOICE

Black-and-White Portrait

15-Inch Gray Scale Portrait Display This gray-scale display system's paper-white phosphor, sharp focus, and low price add up to an excellent value. **Company:** Mirror Technologies. **List price:** \$399; with video-display board \$549.

Gray-Scale Portrait

Pivot Display Its quality imaging, particularly for gray-scale clarity and text sharpness, plus its pivoting feature make this display system an excellent choice. **Company:** Radius. **List price:** \$849 plus \$299 for video-display board.

Black-and-White Two-Page

MD 202 Two Page Display A competitive price, good contrast, and sharp focus make this system an excellent choice. **Company:** Mobius Technologies. **List price:** \$699; with video-display board, \$798.

L-View MultiMode Six pixel densities, sharp focus, and low distortion distinguish this higher-priced system. **Company:** Sigma Designs. **List price:** \$1099 plus \$299 for video-display board.

Gray-Scale Two-Page

MultiMode 120; SilverView Pro The MultiMode 120 offers six pixel densities for a relatively high price; the SilverView Pro's much lower price makes it an excellent value. **Company:** Sigma Designs. **List price:** MultiMode 120 \$1099 plus \$1299 for video-display board; SilverView Pro \$1299 plus \$549 for video-display board.

the far smaller portrait displays.

The Sigma MultiMode 120 and SilverView Pro and the SuperMac Platinum 21 all have relatively paper-white phosphors. The phosphors of the Radius, Sampo, and Lapis monitors all tend toward blue, while those in the remaining monitors are on the green side.

In terms of brightness, the MultiMode 120, SilverView Pro, and Sampo are at the top according to both measurement and perceptual evaluations. Dimmest of the group is the Lapis Two Page, while the remaining are all in between (and perfectly acceptable). The Platinum 20, Platinum 21, and RasterOps 21-inch all let you adjust brightness above the currently optimal position. Measurement tests of contrast rate the RasterOps 21-inch monitor best, the Platinum 20 and the Lapis Two Page worst, and all the others good or better. Perceived contrast tests place the Sigma MultiMode 120 at the top and the Radius 19-inch and 21-

inch, Sampo, Sigma SilverView Pro, and SuperMac Platinum 21 not far behind. Perceived contrast in the Lapis Two Page was poor. We also did a perceptual test on the Ikegami DM2010 (sold by several vendors), which arrived too late for lab measurement.

The highest marks in perceived sharpness go to all three Sigma monitors. The RasterOps 21-inch monitor, which has a ghosting problem similar to the Mirror 21-inch's, and the Radius 19-inch display receive the lowest marks, while grades for all the others are very good. Distortion is negligible in all monitors.

Gray-scale linearity tests place the SilverView Pro and RasterOps 21-inch monitors at the top of the rankings and the Lapis Two Page at the bottom, but perceptual ratings by the panel do not entirely agree. The panel rates the RasterOps 21-inch, Sigma MultiMode 120,

and SuperMac Platinum 20 and Platinum 21 equally high in gray-scale rendering; the Sampo and Lapis Two Page monitors received the lowest marks.

All the gray-scale two-page monitors have both brightness and contrast controls; these controls and the power switch are relatively convenient in all but the SilverView Portrait. Because that monitor stands on end, the power switch ended up underneath and toward the back, where it is difficult to reach.

Overall, the panel's gray-scale favorites are the Sigma MultiMode 120 and SilverView Pro. The MultiMode 120 is the one of the most expensive, but as with the L-View, some may find its multiple pixel densities worth the added expense. We think most people will take to the SilverView Pro's lower cost, which makes it a great value. The panel rated the Ikegami DM2010, SuperMac Platinum 20 and



Monochrome Monitor Quality

PERCEIVED QUALITY
 ■ = Best result in test
 B&W = Monitor displays only black and white

For perceived quality results:



Small Display
 Apple Macintosh 12"

Portrait Displays

Apple Macintosh Portrait
 Lapis Full Page
 Lapis Full Page Gray Scale
 Mirror 15-Inch Gray Scale
 Mobius MD 102, 103 One Page
 Radius Full Page
 Radius Pivot
 RasterOps 15" Mono/Gray Scale
 Sigma PageView GS

Two-Page Displays

Lapis Two Page
 Mirror 19-Inch Two Page
 Mirror 21-Inch Gray Scale
 Mobius MD 202 Two Page
 Radius Two Page/19
 Radius Two Page/21
 RasterOps 21" Mono/Gray Scale
 Sampo OfficePro IIa[†]
 Sigma L-View MultiMode
 Sigma MultiMode 120
 Sigma SilverView Portrait
 Sigma SilverView Pro
 SuperMac Platinum 20
 SuperMac Platinum 21

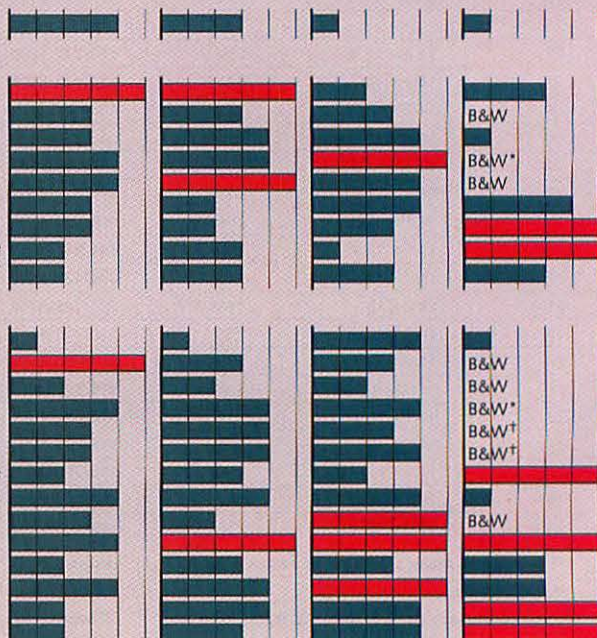
Brightness Contrast Sharpness Gray Scale

A monitor's color cast can fool the eye into seeing the monitor as darker than its measured brightness (blue casts do this most).

A monitor's brightness level determines whiteness, while the electron beam's control circuitry determines blackness.

Slightly inaccurate electron-beam controls result in faint shadows behind objects; a greater inaccuracy leads to fuzziness.

Most monitors' electron-beam controls overly darken dark grays and overly lighten light grays, causing blurry highlights and shadows.



* Can display gray scale with third-party video-display boards.

† Can display gray scale with color RasterOps board.

‡ Sold by several vendors.

Platinum 21, and the two Radius monitors only slightly behind its favorites; in terms of street price, all three vendors' 19-inch models are a very good value.

The panel rated the Sampo display as very good except for gray-scale display. With one of the lowest prices, this is a definite candidate for the financially strapped—especially for people who don't do gray-scale work. The Lapis Two Page came out as lowest in quality overall.

One two-page gray-scale monitor we received too late to formally test—the Nanao FlexScan 6500—requires built-in video or a third-party video-display board. Perceptually, the paper-white Nanao appears to be a very good, but not excellent, display. An optional \$65 cable lets you change pixel densities. However, unlike with the Sigma Designs Multi-Mode displays, you must restart the Mac to change the Nanao's resolution.

The odd man out is the SilverView Portrait, which the panel deemed a very good product. This large portrait display is specifically designed for viewing tabloid-size publications one page at a time. If this is the way you work, you may find the SilverView Portrait worth its hefty price tag; most everyone else will prefer one of the more standard systems.

You Must Remember This

MACWORLD LAB TESTED ALL MONITORS for emissions of extremely-low-frequency radiation. There is, as yet, no scientifically determined range within which ELF emissions are deemed safe or unsafe, but *Macworld's* rule of thumb (less than 1.5 milligauss—equivalent to typical background radiation levels in an office—28 inches from the display), when applied against our test results, indicates that none of the emissions from any of the

tested monitors are out of the ordinary.

Not so long ago, monitor shopping was a time-consuming process, by the end of which you began to think you'd been doing this all your life. But now the differences between most monochrome monitors are not great and quality, for the most part, is high, so you can spend more time thinking about special details of interest to you and less worrying about whether the fundamental things apply. And hitching up a high-quality monitor that has all the little extras you want—that, my friend, is just the beginning of a beautiful friendship. ■

When he's not contemplating Macintosh matters, contributing editor ROBERT C. ECKHARDT travels the rivers and backroads of Central America in search of Mayan ruins.

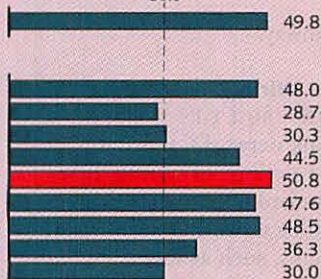
Macworld Lab testing supervised by TIM WARNER.

MEASURED QUALITY

Maximum Brightness

Most people prefer a brighter monitor. We turned up the screen's brightness as high as it could go without showing scan lines. A monitor that puts out less than 20 footlamberts is considered dim.

30 OR MORE IS GOOD
30.0

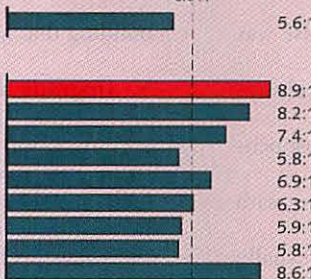


Footlamberts

Contrast Ratio

The better the contrast ratio, the better you can see details in both light and dark areas of an image. We calculated the ratio between the luminance of white and black squares throughout the screen.

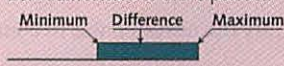
6.0:1 OR MORE IS GOOD
6.0:1



Ratio of white luminance to black

Distortion

The greater the difference (the bar's length) between the screen's minimum distortion and its maximum distortion, the more noticeable the distortion will be. A difference of 0.0 is perfect.



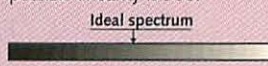
8.0 OR LESS IS GOOD



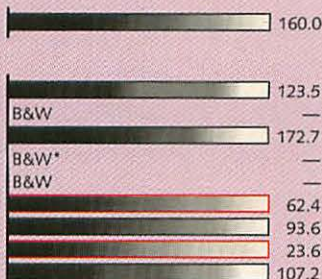
64ths of an inch

Gray Linearity

Gray linearity shows how accurately a monitor displays shades of gray across the spectrum from black to white. Perfect linearity measures 0. The worst possible linearity is 900.



202.5 OR LESS IS GOOD



Total of variances from ideal values in 12 tests

BUILDING AN EXPANDABLE NETWORK

The design of most Macintosh networks belies their bootleg history. At many companies, Macs were brought in through the back door and were not supported by the company's technicians and computer managers. This meant that the average Macintosh network first consisted of a connection between one Mac and its printer. Frequently the next step was to connect a few more devices in a daisy chain so that people could share the printer, but little else was usually done. Although Apple has always had a LocalTalk wiring standard, most people opted to connect network devices with low-cost LocalTalk connectors (usually Farallon Computing's PhoneNet Connector)

and standard phone wire. That

cheap, ad hoc solution helped everyday users solve the basic problem of connecting Macintoshes and peripherals.

Macs are now an important part of corporate life, and LocalTalk is no longer suffi-

cient for the large Mac networks in corporate environments. Still, a little planning can help anyone turn an ad hoc Mac network into a full-fledged, high-speed communications highway that everyone can use. The following tips for five basic areas of network design should put you well on your way to building that highway.

1. Upgrade the Wiring

APPLETALK, THE BUILT-IN PROTOCOL used on LocalTalk networks, was designed to be used on a variety of wiring types, including the standard phone wires that run through most office walls. But such wiring can cause problems, such as lost data, and can severely limit expansion of the network.

PROBLEM In most cases, especially in a rented space, the wiring is owned by the landlord, not the tenant. Modifications to this wiring may be difficult to perform or even prohibited by the owner. Also, it is often difficult to find accurate wiring diagrams. Installation, maintenance, and troubleshooting can become a nightmare without basic information about where the wires are in the walls and how they are spliced and terminated.

The costs of maintaining a phone-line-based network are extremely high when you factor in the amount of wasted support time and lost productivity when the network fails.

BY DOUGLAS E. WELCH

SOLUTION When planning for new wiring in an office or building, consider future uses. Some unused areas may later become offices, printer stations, or cubicles—where you'll want to have nodes. Wire all areas at installation time so that

Existing phone wiring may work fine for 20 or 30 devices, but device number 31 might cause problems across the entire network. So, while phone wiring can be used to start a network, it is in everyone's best interest to develop plans for using

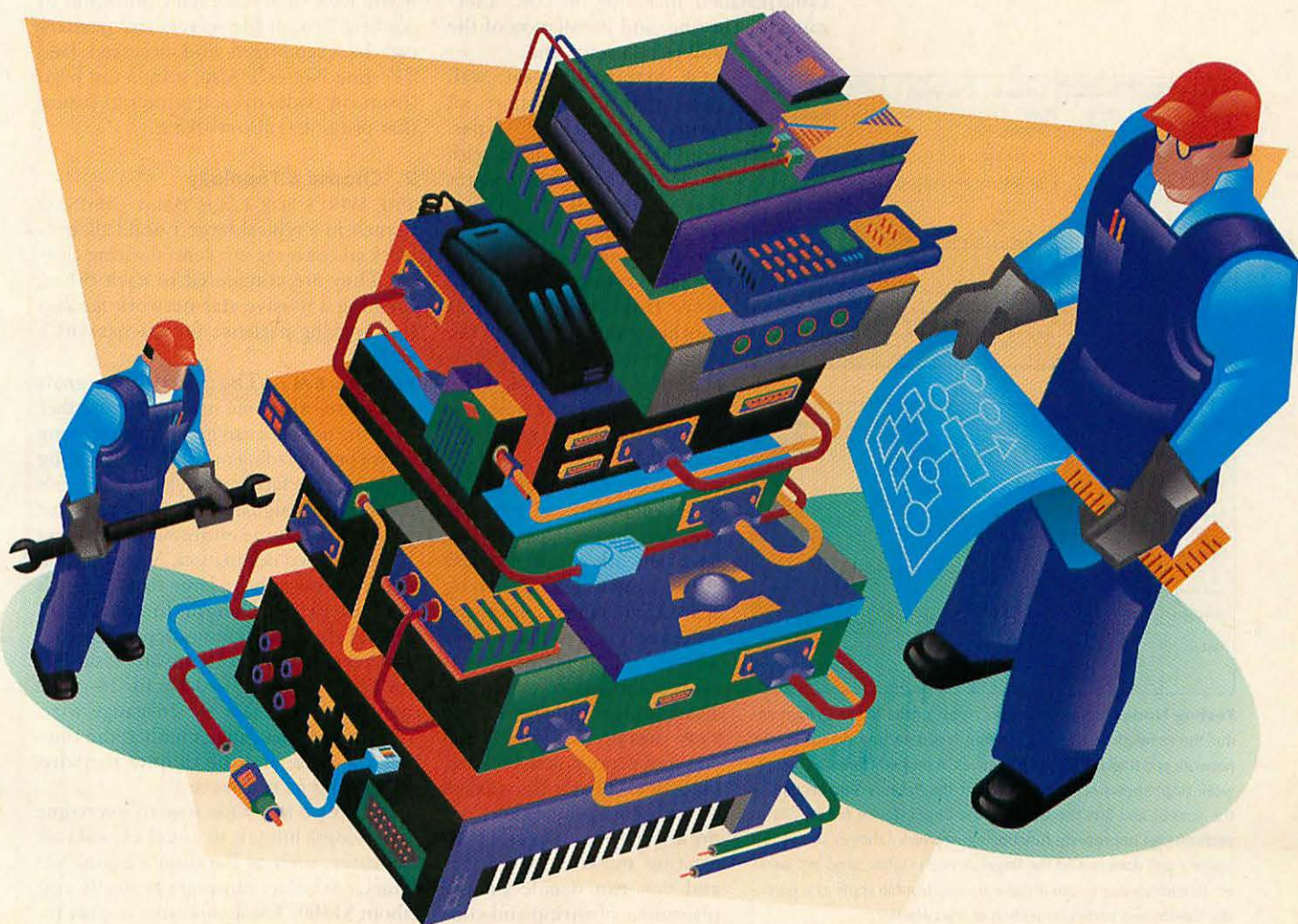
PLANNING AHEAD WILL SAVE YOU HEADACHES LATER AS YOUR MAC NETWORK GROWS

you can extend the network to those areas as you convert them from unused space to someone's desk or printer space.

PROBLEM The line quality of internal phone wiring is an unknown. Poor-quality wire makes it difficult to expand a network to provide for higher-speed protocols like Ethernet or Token Ring. The AppleTalk protocol, partly because of its slow transfer rates and protocol design, works well over lines of uneven quality. But higher-speed protocols are more sensitive to line quality. If the wiring is poor, networks based on these protocols can experience unacceptable errors during data transmission or can even cease to function.

dedicated network wiring to support future growth. By providing your data with the best possible path to follow, you will be creating a good foundation for the rest of the network.

SOLUTION Select the proper type of wire. United Laboratories (known best for the UL fire-prevention certification seen on many devices) provides a five-level standard for deciding which type of wire fits your present and future needs. Level 1 is for data rates below or equal to 200 kilobits per second (Kbps), which is the transfer rate of a standard LocalTalk connection; Level 2 is for 4 megabits per second (Mbps) and slower; Level 3 is for 20 Mbps and slower (Ethernet's 10-Mbps



speed fits in this level); and Levels 4 and 5 are for speeds of up to 200 Mbps.

TIP Wall jacks are rated by using the same system as wires use. Make certain that you match, for example, Level 3 wire with Level 3 wall jacks, or Level 2 wire

nections as the floor plan develops. By working with designers and contractors, you can create a network wiring plan that will meet your needs for many years to come.

TIP Most offices already have an ad hoc

UPGRADE YOUR NETWORK ONE SECTION AT A TIME TO KEEP IT OPERATIONAL

with Level 2 jacks.

TIP Put in more wire than you think you need. A good rule of thumb is to install 1½ times the wiring needed to support the current usage. This gives you room to grow and offers flexibility in network setup. For example, LocalTalk cabling requires two wires (one pair), Ethernet requires four wires (two pairs), and voice/fax/modem lines require two wires (one pair). With 4-pair wiring (8 wires) you can use all these features in the same office at the same time. (No matter how many pairs are used, this cabling is called *twisted-pair wiring*.) And you can have multiple connections if offices will be shared or if they will contain more than one computer or peripheral device.

Expect to spend about \$100 for every cable installed, including the cost of termination, testing, and installation of the wall jacks at each end.

TIP Standardize on wall jacks that can support all future networking types. Equipping all wall jacks with the RJ-45 connectors ensures that LocalTalk, Ethernet, Token Ring, and voice lines can all use the same jack and the same wiring. That way, to move from one protocol to another you just change the connection in the wiring closet and add a new cable from the computer to the wall jack. No new wiring or wall jacks are required.

TIP Consider phone service when planning a network installation. Perhaps you can have network wiring installed at the same time and thereby spare some contractor costs. This also ensures that everywhere a phone connection is made a network connection is also installed, and vice versa.

TIP Install the wiring when you move into a new building or office. That's the easiest time to do it, since there are no worries about keeping an existing network operating, and you can decide on the placement of wiring and con-

nections as the floor plan develops. By working with designers and contractors, you can create a network wiring plan that will meet your needs for many years to come.

If the Macs are connected via existing phone wiring, you can put new wiring in place without disturbing the current network. After the new network wiring is in place and has been tested, one evening or weekend is usually enough time to reconnect the Macs and confirm that everything is working properly.

How do you know the new network is working properly? First, have the wiring contractor check the wiring for electrical continuity and other errors to ensure that no damage occurred during installation. Then, using a portable Mac, if you have one, test each connection to confirm that all file servers and printers can be recognized and accessed (see "Testing Nodes"). Also, print a test page (from any node) to each printer to ensure that printing is also working.

2. Choose a Topology

THE WIRES FOR EACH DAISY-CHAINED branch in a typical large LocalTalk network all converge in a central wiring closet. They are connected to each other, forming a passive star network *topology* (networking parlance for the network's layout).

PROBLEM The electrical signals that travel from one machine to another over the network can go only so far along a wire before fading out. The more wiring you have, the farther the electrical signals must travel; a signal on a passive star must travel through the entire network to get to its intended destination. A network can quickly grow to be so large that it exceeds the severe wire-length limitations of LocalTalk. Length limits depend on wire thickness; common limits are 4500 feet for 22-gauge wire, 3000 feet for 24-gauge wire, and 1800 feet for 26-gauge wire. (The higher the gauge number, the thinner the wire; and the thinner the wire, the greater its resistance.)

SOLUTION One way to overcome wire-length limits is to install a LocalTalk repeater, such as Farallon's PhoneNet StarController; repeaters typically cost about \$1300. These repeaters amplify the

Device: Net: 42004 Node: 190 Boneless Chicken Ranch - Macintosh IIfx - Server Zone

Packets: 20 Using: ☐ Echo Pkts ☐ Printer Status Packets ☒ System Info Packets

Interval: 2.5 Secs

Timeout: 1.5 Secs

Packets Sent: Rcvd: 4 Left: 16 Last: 0 Total: 4

	Current	Average	Minimum	Maximum
Hops Away	0	0.00	0	0
Delay (secs)	0.17	0.05	0.00	0.17

Status: Macintosh System File Version 7.0.1, © Apple Computer, Inc. 1983-1991
Macintosh Finder Version 7.0, © Apple Computer, Inc. 1983-1991
Printer Driver: Other Laserwriter 7.0, © Apple Computer, Inc. 1983-1991
Responder: NET Version: 203
AppleTalk Driver Version: 57 AppleShare Version: 7.0

Buttons: Stop, Done, Clear

Device: Net: 42002 Node: 100 marvin - LaserWriter - Server Zone

Packets: 20 Using: ☐ Echo Pkts ☒ Printer Status Packets ☐ System Info Packets

Interval: 2.5 Secs

Timeout: 1.5 Secs

Packets Sent: Rcvd: 3 Left: 19 Last: 3 Total: 3

	Current	Average	Minimum	Maximum
Hops Away	0	0.00	0	0
Delay (secs)	0.00	0.08	0.00	0.23

Status:

Buttons: Stop, Done, Clear

Testing Nodes A program like Apple's InterPoll lets you monitor the network's status by sending test data to a device on the network and tracking whether it arrives. A properly functioning network (top) shows no lost packets (at the Packets Sent section of the screen) and lists the status of the target device (at the Status section). An improperly functioning network (above) shows lost packets and does not list the target device's status. Send test packets to each device to see if there are any trouble spots at a particular device or a particular section of the network.

Ideal Network Growth

A network typically grows in stages. But this evolution can be planned so that the network works well at each stage. The accompanying feature describes in greater detail how to move your network from stage to stage.

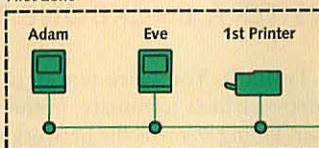
KEY

	Macintosh		Zone
	DOS PC		Router
	Printer		Concentrator
	Server		Repeater
	Patch panel		LocalTalk
	Star controller		Ethernet
			TCP/IP

STAGE 1: Cobbled Networks

Macintosh networks often start as a series of daisy-chained Macs and printers connected by phone wire. This is fine for small LocalTalk networks, since traffic is not an issue.

First Zone

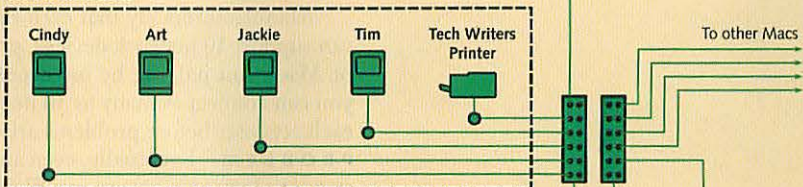


STAGE 2: Small Department

Once you get more than a handful of Macs, you should add a patch panel to connect the Macs so traffic between any two does not depend on the daisy chain working across all Macs. This arrangement is called a star.

You should also replace the phone wire with better wiring designed for networking, and start creating zones and standardizing node names to make it easier to locate nodes.

Tech Writers Zone



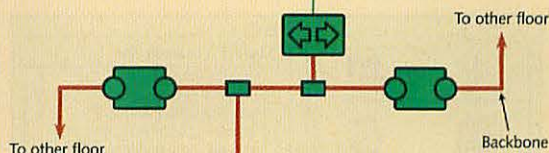
STAGE 3: Large Department

When the network gets large enough that it begins to lose data, you need to add an active star controller to boost the signals between branches on the star.

STAGE 4: Linked Departments

When you connect to other department networks, you should use a high-speed backbone, such as Ethernet. You need a router between each network and the backbone.

If the backbone connects to other floors or buildings, you need a repeater at that connection.



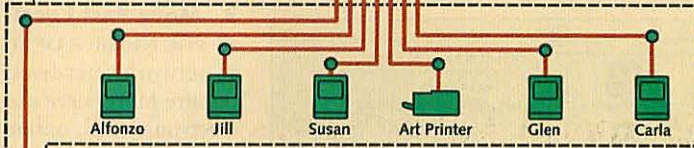
STAGE 5: Corporate-wide Integration

In a mixed network, you link different local networks, typically through an Ethernet hub (such as a patch panel or star controller).

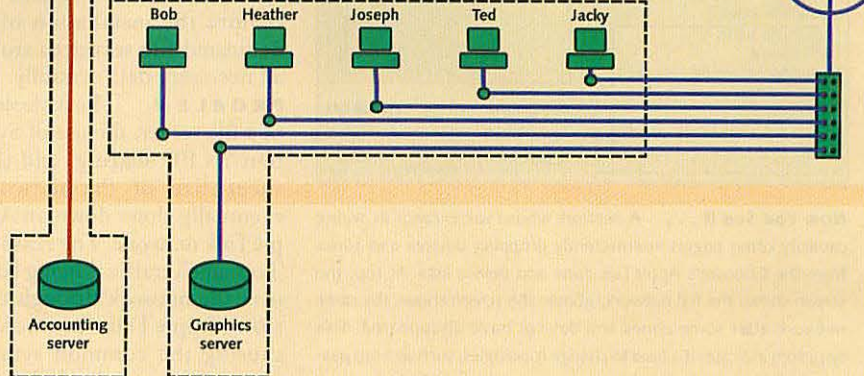
You should also use a concentrator on a non-Mac local network to add expansion options and allow convenient backbone tapping (to add branches). Communication between DOS PCs and Macs is determined by software, not hardware, so routers are not needed. But if large amounts of traffic are involved, routers come in handy, since they filter out specific protocols and make the amount of traffic within each branch manageable.

If the network is robust enough, like Ethernet, all the signals can travel throughout the entire network across multiple platforms. If you have the proper software, you can read any signal from any platform.

Graphics Zone



Accounting Zone



STAGE 6: Massive Shared Data

If you work with large files for graphics and data, you should place the files on dedicated servers.

Servers are also useful for high-volume traffic such as electronic mail.

You may have servers on any network branch, but make sure your highest-volume servers are on a high-speed branch.

LocalTalk signals so they can travel much longer distances. Repeaters also provide some management tools that can, for example, automatically remove a malfunctioning machine from the network and track network traffic (see "Monitor-

work: increased errors, disappearing services, and slow printing speeds.

SOLUTION Upgrade to the next network level: Ethernet, a high-speed data-linking protocol that transfers data at 10 Mbps. (LocalTalk transfers data at 230

ATTACH HIGH-VOLUME SERVERS TO A BACKBONE TO OPTIMIZE TRAFFIC

ing Traffic"). You place repeaters where all network lines terminate, in the wiring closet. Doing so turns the network into an active star, in which a repeater actively amplifies the signals to ensure that they reach every machine on the network.

Manufacturers say that each repeater can support 10 network devices, printers, or Macs. But judging by my experience, you can connect as many as 30 devices to each repeater before problems arise.

PROBLEM Eventually, even an active star topology also proves insufficient for large or complex networks, particularly those that go between floors or buildings. One of the first symptoms of an overloaded network is slow printing. Repeaters can also begin showing high error rates on their status panels or in their monitoring software's log files. In a severely overloaded network, shared devices—such as printers and servers—will begin disappearing from the Chooser's listing (see "Now You See It...").

SOLUTION An overloaded LocalTalk network requires the next big step in expanding a network: the use of routers and a high-speed backbone to separate the traffic on the network so it is more manageable.

Kbps, or about 1/40 the speed of Ethernet.)

To connect Macs via Ethernet, you need an Ethernet board or external Ethernet box (either of which costs \$200 to \$300) on each Mac. While Quadras offer built-in Ethernet (thus needing no board), they do require a \$175 transceiver.

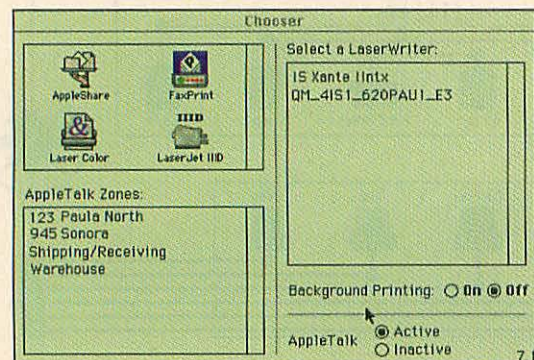
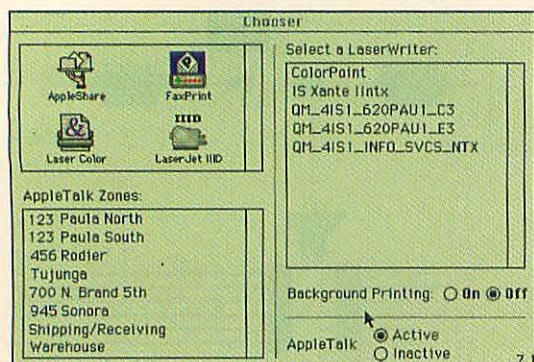
TIP Not everyone on the network needs to be connected via Ethernet—you can still connect many Macs via LocalTalk. All users could connect directly to the high-speed network using Ethernet boards (or the built-in Ethernet in the Quadras), or all users could connect to members of their own group via LocalTalk and the groups could connect to each other over an Ethernet backbone—essentially a mininetwork that connects network branches. You can also mix these two approaches so that, for example, graphic artists are linked directly to each other via Ethernet so they can send huge files of scanned images and page layouts relatively quickly, while accountants and administrative personnel are linked via LocalTalk, since their spreadsheet and text files are typically not large.

To connect LocalTalk-based groups to other LocalTalk-based groups via an Ethernet backbone, all you need is a LocalTalk-to-Ethernet router such as Shiva Corporation's \$1999 FastPath/5 and the high-speed wiring you have already installed. A router lets LocalTalk protocols pass from the strictly LocalTalk environment of the original network to the Ethernet environment of the backbone and back again.

TIP Similarly, attaching high-volume servers directly to a backbone lets you separate the majority of heavy traffic from the day-to-day traffic, which remains on the LocalTalk side of the router.

4. Add a Server

SERVERS ARE COMPUTERS THAT TYPICALLY have high storage capacity so you can put common data—whether files or applications—in one place for everyone to access. Servers can also make electronic mail and printing more efficient; for example, sending all print jobs to a print server keeps the user's Mac from being tied up in processing the file or waiting for a printer to be ready—the server does all the waiting.



Now You See It . . . A network whose size exceeds its wiring capacity often begins intermittently dropping devices and zones from the Chooser's AppleTalk zone and device lists. At top, the screen shows the full network; above, the screen shows the same network after some zones and devices have disappeared. This symptom indicates it's time to change topologies, such as from passive star to active star, or to add routers and a backbone.

3. Move Past LocalTalk

AS THE NUMBER OF MACS ON a network increases, users require more services, such as electronic mail, online calendars, and file sharing. Most of those services recommend or require the installation of a dedicated file server to store all necessary data centrally.

PROBLEM The inclusion of a file server, the use of System 7's file sharing, and the sheer size of the network eventually slows down an AppleTalk network. The reason? Too much traffic is being sent over the network through the slow AppleTalk protocols, causing the common symptoms of an overloaded net-

NETWORK HARDWARE SOURCES

	LocalTalk Connectors	SCSI-to-Ethernet Connectors	Ethernet Boards	Hubs, Repeaters, and Concentrators	Routers	Consumer Contact: Toll	Consumer Contact: Toll-Free
Allied Telesis	○	○	●	●	○	415/964-2771	800/424-4284
Anco Corporation	○	○	●	●	○	714/992-9000	800/545-2626
Apple Computer	●	●	●	○	●	408/996-1010	800/776-2333
Asanté Technologies	○	●	●	●	○	408/435-8388	800/662-9686
Avatar Corporation	○	○	●	○	○	508/435-3000	800/282-3270
Cabletron Systems	○	●	●	●	●	603/332-9400	800/332-9401
Cayman Systems	○	○	●	●	●	617/494-1999	none
Chesapeake Systems	○	●	●	●	●	410/243-1023	none
Chipcom	○	○	●	●	●	508/460-8900	800/228-9930
Codenoll Technology	○	○	●	●	○	914/965-6300	800/966-1512
Compatible Systems Corporation	●	●	●	○	●	303/444-9532	800/356-0283
David Systems	○	○	●	●	○	408/541-6000	800/726-7848
Dayna Communications	○	●	●	●	●	801/531-0600	none
Engage Communication	○	○	○	○	●	408/688-1021	none
EOP Group (an AMP Company)	○	○	○	●	●	919/481-5100	800/888-5261
Farallon Computing	●	○	●	●	●	510/814-5000	800/998-7761
Focus Enhancements	●	●	●	●	○	617/938-8088	800/538-8866
Hewlett-Packard	●	○	○	●	○	none	800/752-0900
International Transware	○	○	○	○	●	415/903-2300	800/999-6387
Lancast	○	○	●	●	○	603/880-1833	800/752-2768
LRU Systems	●	●	●	○	○	415/594-9697	none
MacProducts USA	●	●	●	●	●	512/472-8881	800/622-3475
National Semiconductor Corporation	○	○	●	●	○	408/721-5000	800/272-9959
Network Resources Corporation	○	○	●	●	○	408/383-9300	none
NetWorth	○	○	○	●	○	214/929-1700	800/544-5255
Shiva Corporation	○	○	○	○	●	617/252-6300	800/458-3550
Sonic Systems	●	○	●	○	●	408/736-1900	800/535-0725
SynOptics Communications	●	●	○	●	●	408/988-2400	none
TechWorks	●	●	●	●	○	512/794-8533	800/688-7466
Thor Manufacturing	●	○	○	●	○	702/324-6600	800/346-4694
3Com Corporation	○	○	●	○	○	408/764-5000	800/638-3266
Tutankhamon Electronics	○	○	○	●	○	510/682-6510	800/998-4888
Webster Computer Corporation	○	○	○	○	●	408/954-8054	800/457-0903
Wellfleet Communications	○	○	●	○	●	617/257-2400	800/252-6926

● = Company offers products of this type; ○ = company does not offer products of this type.

TIP For more moderate server needs, you can enable users to share files among themselves by using file sharing, which comes bundled with System 7. File sharing lets you make any or all of the folders on a Macintosh's hard drive accessible to other users on the network. File-sharing options let you add password protection and determine which groups of users have which types of access (such as read/write or read-only) to shared data. Such a collection of Macs is called a distributed server.

PROBLEM When your network requires major services like electronic mail, you will want to dedicate a Mac to providing that service. While it could run on a user's Mac, the service would slow down that Mac, and the mail system would be unavailable during any restarts and whenever that user turned off the Mac.

SOLUTION To avoid this problem, dedicate one Mac to be an AppleShare server. Dedicated servers make the most sense for storing large files such as color scans and customer databases, since these require more processing power than any user can spare and still use his or her Mac. If you decide to use an existing Mac as a distributed server, expect significant slowdown when other nodes access large files or applications.

TIP While any type of Mac can work as a file server, it is best to use the fastest machine possible—a Mac IIcx at the least (you don't want the server to be a speed bottleneck). Make sure any high-volume servers are connected to frequent users via a high-speed connection like Ethernet. (This prevents another bottleneck.)

TIP One way to reduce costs is to not purchase a monitor or keyboard for the

server—they will rarely be used. Instead, borrow a keyboard and monitor from another machine to set up the server, and from then on use Farallon's Timbuktu (\$199) to operate the server from another Mac or even a Windows PC.

department names that provide them with some indication of how the network is divided.

TIP Printer names should include some geographical designation such as North or East.

A WELL-DESIGNED NETWORK INCLUDES STANDARDIZED NAMES FOR ALL DEVICES

TIP Large networks (more than 100 nodes) or high-volume servers should use a network operating system like NetWare (which costs \$12,495 for a 250-user license, including NetWare for Macintosh software) from Novell (801/429-5540). While AppleShare requires only a Macintosh on either LocalTalk or Ethernet, NetWare requires one DOS-based system for the server and another DOS system for configuration and management. This second DOS machine runs Novell utilities that configure and manage the server. Client software that lets both DOS PCs and Macs talk to the server is included with NetWare.

For the NetWare server, you should use a machine based on the Intel 80386 or 80486 processor, because of its processing power. An inexpensive 80286-based DOS PC is usually fine for the NetWare manager. Together, the two DOS PCs cost about \$3000, plus the cost of the high-capacity storage (perhaps \$800 to \$2000) you should have on the NetWare server.

TIP Because servers are usually located in one central area, geographic clues are not needed, so their names can be more friendly. Some companies name them after cartoon characters or personalities from popular fiction. You can have fun with server names, but make sure they bear some relation to the services they provide—for example, Balance Sheet for the financial users' server and Post Office for an electronic-mail server.

TIP Changing zone names is easy, but doing so can cause users difficulties: automatic log-ons, mail programs, and printer selections, for example, might be disabled when a zone or server name changes.

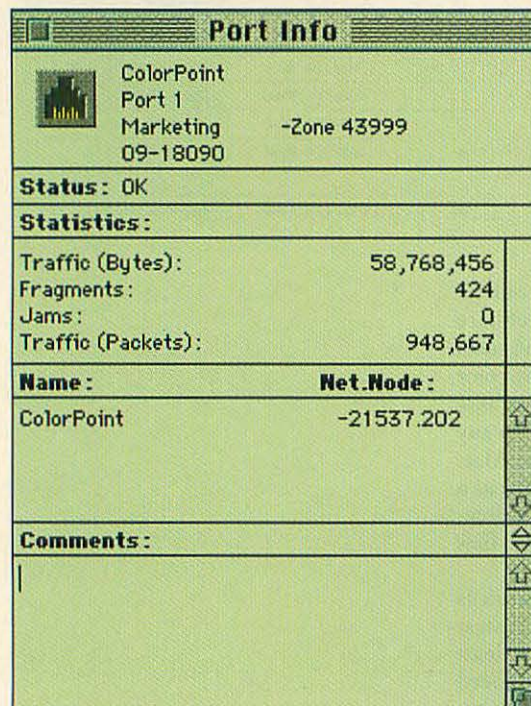
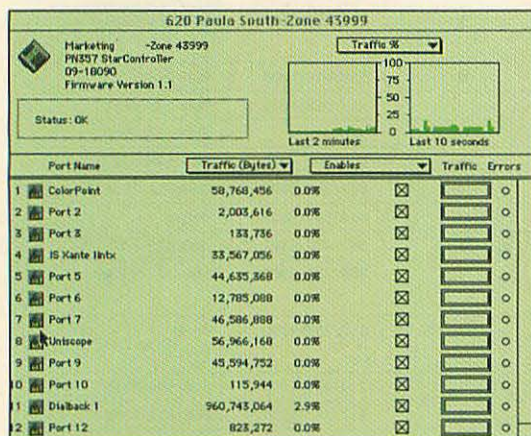
TIP Plan your naming structure to accommodate growth and minimize renaming later. When names do change, make sure that users are informed of how to recover and reset the services they use, like electronic-mail and file-server connections. Although this doesn't usually require reinstalling the products, the setup of both hardware and software often must be altered to point to the newly renamed servers or zones.

Strategies for Growth

WITH NETWORKS, AS IN MANY OTHER endeavors, planning is the secret of success. Whether you are installing a new network in new offices or upgrading an existing one, planning goes a long way toward making the installation cheaper and better while disrupting current work as little as possible.

Allow as much time as possible for configuring and testing the various components. Put together a sample network in one room and test it with current software and any software that the company plans to use in the future to ensure that the network meets the company's needs. Also, make sure that all the pieces work together. Try attaching files to mail messages to see if they get through, and try using dedicated servers at the same time as distributed ones. This type of planning results in the best possible network for both the users and the company. ■

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Monitoring Traffic Star controllers, such as those from Farallon Computing, come with software to monitor the controller's ports. The screen at top shows a report on network traffic; here, traffic is light for all ports, and there have been no errors. The screen above shows the details for one port.

5. Standardize Node Names

A WELL-DESIGNED NETWORK includes some planning for standard Macintosh, zone, printer, and server names. Names like Mac-n-stein are cute, but they tell very little about the owner of the Mac or its location.

TIP You create zones when you divide a network into different segments, usually through the use of a LocalTalk-to-Ethernet router. The names of the zones should reflect this segmentation—typically by including the building names, locations, or departments that are attached to that network segment. Users are usually most comfortable with geographical or

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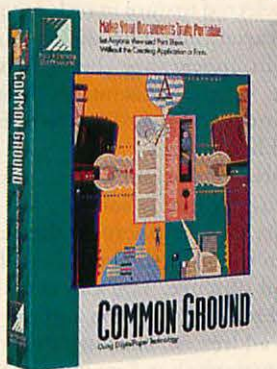
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Circle 299 on reader service card

Reviews

IN THIS ISSUE: Write/Move II, RapidTrak, MacProject Pro, SuperATM, SpreadBase, Theorist, DiskFit Direct, Data Desk 4.0, LapTrack for the Mac, MacPhase, TimeVision, and more

Photoshop Plug-Ins

Kai's Power Tools Volume 1, 1.0

PROS: Nearly inexhaustible supply of creative effects tools; image-editing filters complement Photoshop's standards; texture, gradient, and fractal generators vastly expand Photoshop's capabilities. **CONS:** Mind-boggling user interface; shoddy documentation.

COMPANY: HSC Software (310/392-8441).

REQUIRES: Mac II; 4MB of RAM; math coprocessor; hard drive; 1.4MB floppy drive; color monitor; System 6.0.5; Photoshop 2.0.

Recommended: 8MB of RAM; 24-bit video board; System 7. **LIST PRICE:** \$149.



IF YOU SPEND MUCH TIME ON AMERICA Online and you're at all interested in Adobe Photoshop, chances are you've heard of Kai Krause, electronic Einstein of the Photoshop-tips circuit. Having shared a wealth of techniques over his Kai Power Tips forum for the past year, he has now released a collection of Photoshop plug-ins that include image-editing filters; texture, gradient, and fractal generators; and special-effects tools. Although at times monstrously complicated, the Kai's Power Tools (KPT) collection represents a virtually infinite supply of visual resources that puts previous filter collections like Aldus Gallery Effects to shame. The only problem is getting to first base with them.

Interface from Another Planet

MUCH OF KPT IS ART—BEAUTIFUL TO look at but mysterious in purpose. The Texture Explorer plug-in, for example, features a series of unlabeled marbles emerging along what appears to be a



Green Surreal Spheres The background texture of this image was created using the Texture Explorer followed by KPT's Find Edges Soft filter. Then Gradients on Paths was used to create the black concentric lines and the "green glow." The spheres were created using KPT's Glass Lens filters.

downed tree (see "A New Kind of Dialog Box"). You use the marbles to specify how much the Texture Explorer should mutate a selected texture in order to generate 12 variations. The dialog box is stunning in appearance, but it has no precedent in the Macintosh's visual nomenclature and may leave you frustrated and bewildered.

The present documentation doesn't help much. Although each dialog box provides its own help screen, the text—like that in the printed manual—is haphazard and obscure. You can even find occasional reminders to the authors that never got addressed, such as "Enter the mutation metaphor and its implementation here!" According to HSC, new documentation is due out soon.

Down-to-Earth Filters

ONCE YOU GRASP KPT'S UNUSUAL LOGIC, however, the software takes on a life of its own. All together there are 33 plug-ins, 24 of which produce immediate effects. You can add noise to a selection within the confines of the selection's color scheme, disperse pixels randomly throughout the selection area to create a sort of shaken-sand-art effect, apply a horizontal motion blur that extends only in a single direction and either darkens or lightens the selection area, and adorn your images with glass bubbles complete with highlights and shadows. Each one complements Photoshop's built-in filters by supplying a much-needed variation on an existing filtering theme. KPT's flashiest immediate-effect filter is 3-D

Stereo Noise. This filter assigns depth to a gray-scale image by converting it to a repeating pattern of black and white pixels (see "Op Art for a New World Order"). After the filter is applied, you relax your eyes and look beyond the image so that a cluster of pixels viewed with the left eye coincides with its immediate neighbor viewed with the right eye. If you're able to fool your eyes into accepting the effect, the image appears to take on several inches of real depth, like a 3-D movie but without the glasses. Dark areas from the original gray-scale image appear farthest away; light areas appear the closest.

Cosmic Shower of Special Effects

IF THIS WERE THE EXTENT OF KPT'S capabilities, it'd be just a ho-hum filter collection. What ultimately makes the package one of the finest image-editing tools for the Mac are its texture, gradient, and fractal generators. Designed for advanced users, these generators enable you to explore entirely new artistic frontiers.

The Texture Explorer lets you choose one of more than 100 predefined textures. You can then generate variations by specifying the degree of mutation. Though many variations end up looking like arbitrary spray patterns, some yield stunning results. KPT can apply the finished texture according to a *procedural blend* so that it fades away in light areas and concentrates in dark areas. The result is a texture that follows the contours of a selected image rather than simply covering it.

The Gradient Designer allows you to create a multi-colored gradation, specify its direction, and adjust the shape and style of color transitions. A bracket lets you isolate specific portions of the gradation so you can decide where transitions start and stop, as well as control their speed. If you click on the Einstein button and enter the secret code (available from HSC Software for \$39), you enter the professional-level Expert mode. In this mode, you can insert alpha-channel entries into a gradation to make certain portions transparent. You can also access special color spectra, including a palette of

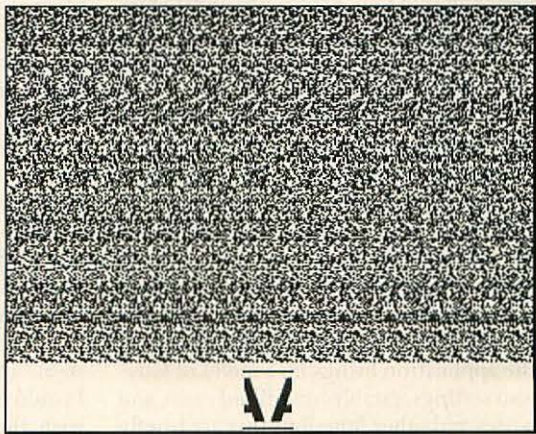


A New Kind of Dialog Box Radio buttons, check boxes, and 2-D icons are a thing of the past in Kai's Power Tools. In their place are extensive hierarchical pop-up menus, spherical buttons that highlight when the cursor passes over them, and surrealistic accents like the emerging stream of marbles shown on the left.

"legal" CMYK colors (that is, they're guaranteed to print reliably from process-color separations).

So far as the four fractal generators are concerned, you'll go far so long as you don't expect to understand what you're doing. You can create some remarkably naturalistic images using fractals, and KPT draws its fractals very quickly. But be prepared to spend a lot of time monkeying around with friendly options like Julia Speed Constant and Real and Imaginary Complex Plane Focus.

On its own, Photoshop is one of the best graphics applications for the Mac. Combined with Kai's Power Tools, it's absolutely unbeatable. No one who uses Photoshop regularly should be without this amazing tool.—DEKE MCCLELLAND



Op Art for a New World Order Hidden among these seemingly random dots is a simulated 3-D effect created using the KPT 3-D Stereo Noise filter. Look beyond the page so that the two halves of the A beneath the dots separate into four halves, then refocus your eyes slightly until the two center halves fuse to form a single A. Look up at the noise without changing your gaze and you'll see three numbers floating down a hole. Be patient. It may take you several minutes or even multiple attempts to see the effect, but it's well worth the effort.

Portable Printer for PowerBook

WriteMove II

PROS: Compact; high-quality output; flexible print utility. **CONS:** Slow; AC adapter can be confused with PowerBook's.

COMPANY: GCC Technologies (617/275-5800).

REQUIRES: Mac Plus; hard drive; System

6.0.7. **LIST PRICE:** \$599.



GCC'S WRITEMOVE II PRINTER WAS designed especially for PowerBook users. Measuring just 11½ by 2 by 3½ inches and weighing 2½ pounds, the WriteMove II fits easily into many carrying cases. The printer's dark gray color matches the PowerBook's. Although the plastic is not as sturdy as that of the PowerBook, the printer should hold up with reasonable care.

WriteMove II's front panel sports a power switch, a print-darkness dial, and buttons designed to advance and retract paper and put the printer online or offline. A small light glows when the battery is recharging, and an LED indicator window displays the printer's condition, including battery charge and paper and ribbon status. A 32-inch cable connects the WriteMove II to the Macintosh serial port.

The WriteMove II comes with a nickel-cadmium battery that fits into a compartment on the side of the printer, and an AC adapter so similar to the PowerBook's that it's easy to mistake one for the other (but be careful—they're not interchangeable). A full recharge takes about 6 hours and in my tests was sufficient to print between 10 and 20 pages, depending on the complexity of the documents. To conserve power, the printer shuts off automatically after about 3 minutes of inactivity.

Pulling the printer's top cover back reveals a holder for snap-in ribbon cartridges. The WriteMove II ships with two ribbons: a single-strike ribbon that produces high-quality output but is good for only about 20 pages of double-spaced text. The reusable multistrike ribbon lasts for about 80 pages at some cost to print quality. Replacement cartridges cost about \$5 each.

A fold-down tray located at the back of the WriteMove II can accommodate most weights of plain paper. To print on transparencies, envelopes, or thick stock, you can feed sheets into an opening on the bottom of the printer. The WriteMove II has no automatic sheet feeder, but given the limited jobs the

continues

printer is designed to handle, that should not be a problem.

GCC's printing software is a genuine joy to use, and the thorough manual is easy to follow. An installer loads the printer driver and the GCC Print Manager and extension onto the hard drive. The printer also ships with Adobe Type Manager and six Type 1 PostScript fonts, although it's also compatible with TrueType fonts.

The Chooser-selectable printer driver provides several handy options. For example, you can define custom paper sizes to supplement the standard formats, and the Print dialog box includes a page-preview feature similar to Microsoft Word's. The driver also lets you scale the output between 25 and 400 percent in 1 percent increments.

Because WriteMove II's driver uses the Mac's QuickDraw routines to image pages before sending them to the printer, immediate printing ties up the CPU. If you choose delayed printing, however, pages spool to the hard drive and get handed off to GCC's Print Manager application. Unlike Apple's PrintMonitor, the GCC software enables you to change some printing options such as font substitution and the number of copies. You can also specify default settings for the Page Setup and Print dialog boxes and set a priority level for background printing.

The WriteMove II uses a Citizen thermal-fusion engine for printing. The mechanism is rated at 360 by 360 dpi and consistently produces readable text as small as 4-point, even using the multi-strike cloth ribbon. Graphics output also is excellent. Although the WriteMove II is no speed demon (a page of double-spaced text takes about two minutes), it's fine for short jobs, and the noise level is tolerable. For portable printing, the WriteMove II is an excellent choice.

—FRANKLIN N. TESSLER



GCC Technologies' WriteMove II

Hard Drive Formatter

RapidTrak 1.0.1

PROS: Fast, easy-to-use, smart RAM cache settings speed up read performance of slower hard drives; supports DOS-formatted removable media. **CONS:** RAM-hungry; RT Formatter application doesn't work when Radius Rocket 68040 accelerator is running; start-up disks for formatter not supplied. **COMPANY:** Insignia Solutions (415/694-7600). **REQUIRES:** Mac Plus; System 6.0.5. **LIST PRICE:** \$99.95.



INSIGNIA SOLUTIONS' NEWEST PRODUCT, RapidTrak, is a general-purpose drive formatter with a twist. Instead of just formatting, partitioning, and testing a hard drive or cartridge, RapidTrak will improve drive performance as well, especially on slower-speed drives.

RapidTrak provides this speed boost with a smart, driver-level RAM-caching scheme to store frequently used data. Taking Apple's own Disk Cache one step further, RapidTrak offers five different caching techniques based on the way you use your computer.

Insignia Solutions uses the Apple Installer for one-click installation of RapidTrak. Formatting your drive is done through RT Formatter, a fast, slick utility that provides all the features most users will need to format, test, and partition a fixed or removable hard drive. There's an Easy Setup button that runs through the formatting process and sets up a single partition. You need to back up first, as RapidTrak has no safe update feature (some hard drive formatters have this capability, which lets you update the driver without destroying data).

If your needs are more sophisticated, the standard Format button brings up a Partition window when the formatting operation is complete. There you can name your drive, enter partition sizes, and use a pull-down menu that allows you to select a partition type. Selecting the Initialize button completes the operation. Holding down the ⌘ key when launching the application brings up a menu of Custom settings, establishing Blind reads and writes and other functions that are briefly explained in the short manual.

The RapidTrak control panel controls the caching feature. Additionally, it mounts removable cartridges and even provides improved math performance with a RapidMath option. Activating the cache requires restarting, but you can set the type of cache simply by opening the control panel, changing the setting, and

closing the control panel. A Performance Monitor gives you a set of statistics showing how the setting affects performance. Insignia suggests that you experiment with the cache settings until you find the one that provides the best result.

Two other utilities are provided: RapidLock, a control panel that mounts, locks, and sets passwords on drive partitions; and PC DiskJockey, a control panel that works with Insignia's Access PC and Apple's PC Exchange to allow RapidTrak to support MS-DOS-formatted removable cartridges and SoftPC files.

Taken without the cache capability, RapidTrak provided hard drive performance comparable to other general-purpose formatters in my testing. But in one case, with my Quantum 210 drive (using the FWB Bench Test utility), I got results that were a good 20 percent faster in most respects than results from other formatters I've used.

I also confirmed Insignia's own claims of major performance boosts with slower drives, using La Cie's Time Drive utility. A SyQuest 88MB cartridge attached to my Mac IIci, using the Repetitive cache setting at 512K, provided consistent transfer speeds upwards of 2MB per second. I got comparable performance ratings from my Quantum 425MB and Quantum 210MB drives. While Finder-level file transfers didn't speed up noticeably, due to the limits of the Macintosh Finder, opening large applications and documents seemed noticeably quicker.

But there is no such thing as a free ride. It required a minimum 512K RAM cache for *each* drive to provide a noticeable performance boost. The RapidTrak control panel uses an estimated 575K of RAM. That's RAM that you cannot use for running applications. If your computer doesn't have the extra memory, these fancy features might go for naught.

I found technical support friendly and helpful, though it required a toll call and took a couple of calls to get all my questions answered. The manual was clear, and easy to follow, though somewhat brief when explaining the more complex functions of the software.

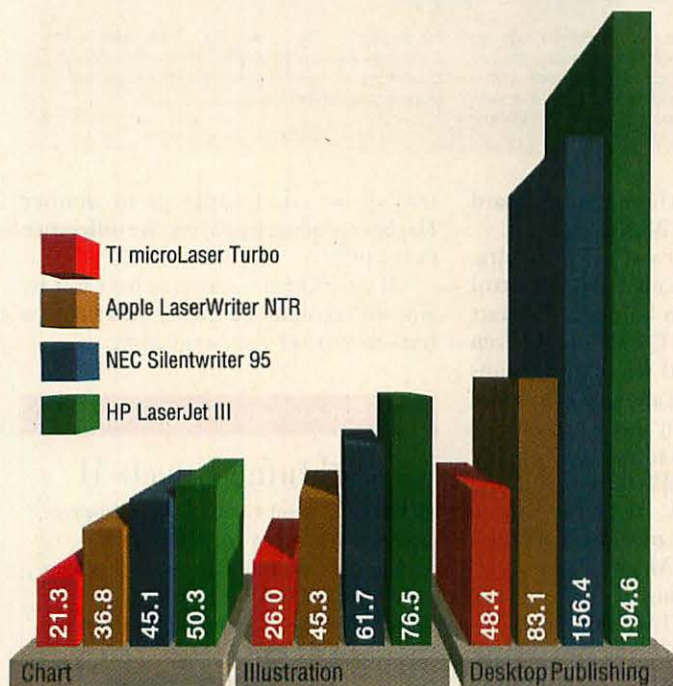
In general, RapidTrak was fast and stable and seemingly bug-free. However, I could not get the RT Formatter to work with the Radius Rocket 68040 NuBus accelerator board.

Insignia's RapidTrak is a solid entry in the general hard drive formatter race. And if you've got RAM to spare, RapidTrak's sophisticated caching capability can provide a healthy performance boost for many slower hard drives and removable cartridges. I recommend it.

—GENE STEINBERG

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*Call TI for a copy of Genoa Technology's benchmark test results and specifications of models tested.

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Cache Card for the Quadra

FastCache Quadra

PROS: Good overall performance; excellent warranty. **CONS:** Wastes a NuBus slot.

COMPANY: DayStar Digital (404/967-2077).

REQUIRES: Mac Quadra 700. **LIST**

PRICE: For Quadra 950, 900, and 700 \$449; for Quadra 900 and 700 \$299.



WHEN YOU FIRST GET A QUADRA, all the applications seem to run so fast it's hard to remember seeing the cursor change from the idle arrow to the "I'm thinking" wristwatch. Six months later, that dreadful watch cursor seems to pop up all the time. Fortunately, you can squeeze a little more performance out of your Quadra by installing a DayStar FastCache Quadra.

The FastCache Quadra is a PDS board that provides 128K of secondary cache. The 68040 in the Quadra already has instruction and data caches built in, but they are only 4K each. When the instruction or data is present in the cache, that information can be loaded into the processor at lightning speed. However, due to the small cache size, most of that information is not in the 68040 cache and has to be fetched from the system-board memory—a much slower process. The FastCache Quadra uses 128K of fast, 15-nanosecond static RAM (25ns static RAM on the 900/700 version). Instructions and data in the 128K RAM of the FastCache Quadra can be retrieved much faster than from the system board's memory.

In terms of real-world performance, the Quadra 950 with the FastCache runs 15 percent faster overall than the stock 950 in the Macworld Lab benchmark. Some operations benefit from the cache card more than others. Microsoft Word scrolling, Infini-D rendering, and Excel calculating, for example, run at least 20 percent faster than on a stock 950. Photoshop's Unsharp Mask operation, on the other hand, showed a marginal improvement of only 3 percent. DayStar admits that the improvement in Photoshop is minimal.

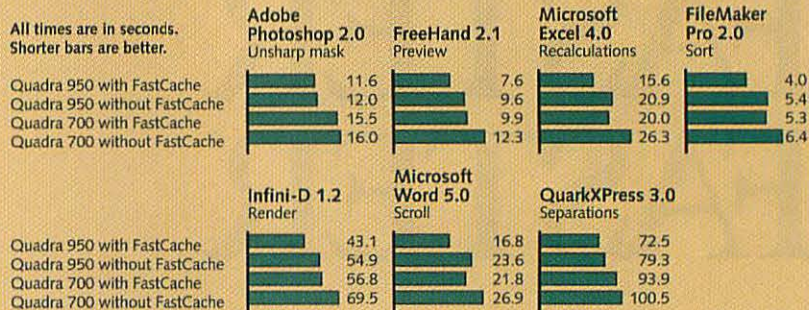
To install the FastCache, just open the CPU, identify the PDS slot, and plug the cache card into it. (If you really want to read the manual, the four-color document has a step-by-step procedure with excellent illustrations.) The only drawback is that a NuBus slot is wasted. Chances are you don't need to use all five slots in the Quadra 950/900, but if you have a 700, you will have only one slot



How Fast Is the FastCache Quadra?

Macworld Lab tested the FastCache Quadra with various applications. Some applications took more advantage of the secondary cache than did others.

All times are in seconds.
Shorter bars are better.



Macworld Lab's application tests included the following operations: unsharp mask on a 807K Photoshop file; preview a 654K FreeHand document; recalculate a 987K Excel spreadsheet that contains mostly transcendental functions; sort an unindexed field in a 410K FileMaker

Pro document; render a simple 15K Infini-D image; scroll a 154-page Word 5.0 document; and separate a 28-page QuarkXPress file that contains text, a color image, and a few gray-scale images.

left—a concern if you have another board already installed in a NuBus slot.

To activate the FastCache Quadra, simply drop the QuadControl control panel into the System Folder and restart the Mac. Then select QuadControl from the control panel and select the options you want. One option allows you to speed up CPU processing by using a technique known as ROM shadowing—copying part or all of the ROM content onto the system board RAM. There are three options on how much memory to allocate to ROM shadowing. Macworld Lab tested the optimum setting of 384K and the maximum setting of 1MB and found little difference between the two. QuadControl's PowerMath option reroutes all mathematical functions to the math coprocessor instead of through SANE (Standard Apple Numeric Environment).

QuadControl also allows the Copyback cache of the 68040 to be turned on and off for selected applications. For example, if the application is not compatible with the Copyback cache, you can turn the cache off. Whenever you launch that application, QuadControl turns off the Copyback cache. When you quit the application, the CopyBack cache turns back on. The applications used in the Macworld Lab benchmark did not have any trouble running with the Copyback cache on.

Like most DayStar products, the FastCache Quadra is well designed, with no jumpers or components that were soldered on at the last moment to fix any design flaws. DayStar pays attention to details—a good indication of quality. The FastCache Quadra has an impressive three-year warranty, a toll-free tech-support line, and an upgrade policy

that allows you to upgrade to another DayStar product by paying the difference in list price.

If your Quadra seems to have lost its zip, we recommend giving this board a try.—DANNY LEE AND MARK HURLOW

Photoshop-Acceleration Boards

Lightning Effects II

PROS: Fast; decent manual. **CONS:** Expensive; limited set of filters; no motion blur or sharpen-edges features; problems acquiring some JPEG files. **COMPANY:** Spectral Innovations (408/955-0366). **REQUIRES:** Mac II; Photoshop. **LIST PRICE:** \$1295.



ThunderStorm

PROS: Fast; good JPEG compatibility; great manual. **CONS:** Expensive; limited set of filters; no rotation option. **COMPANY:** SuperMac Technology (408/245-2202). **REQUIRES:** Mac II; Photoshop. **LIST PRICE:** \$999.



SITTING IN FRONT OF A MAC AND waiting for Adobe Photoshop to finish a filter effect or a resize operation is a familiar occurrence for many prepress and image processing professionals. The ThunderStorm from SuperMac Technology and the Lightning Effects II from Spectral Innovations are NuBus boards that use the digital-signal-processor (DSP) chips to dramatically speed up some Photoshop operations.

continues

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DSP chips are specialized programmable microprocessors that perform a small set of operations very efficiently. SuperMac and Spectral Innovations have programmed these chips to replace Photoshop filters and other plug-ins and to take advantage of the DSP's faster processing speed. How accurately—and how fast—these boards duplicate native Photoshop effects varies.

It's a snap to install the boards, which work in any Mac with a NuBus slot (or the IIsi with a NuBus adapter). Both boards are 32-bit clean and require 32-bit QuickDraw. Each board includes software plug-ins. The ThunderStorm's plug-ins come in a single file; the Lightning Effects' come in separate files. Each product offers replacements for blur, sharpen, resize, and JPEG-file-compression filters. The ThunderStorm has no rotate filter but the Lightning Effects does, while the Lightning Effects has no motion-blur or sharpen-edges filters.

While testing the boards, I ran into an interesting bug in Photoshop. I have an unusually large number of filters and other plug-ins installed with my copy of Photoshop (version 2.0.1). Photoshop limits the number of custom submenus that can appear in the Filter menu. So when I first installed each board, I was unable to get the new filters to show up. However, by removing some of my installed filters, and restarting Photoshop, I was able to get the new filters to appear. Adobe said this limitation will be fixed in the next version.

I tested the filters and effects of each board on a IIfx with 32MB of RAM, running 32-bit clean. I allocated 24MB of memory to Photoshop and used a 7.6MB image file. With this configuration, Photoshop ran all of the effects without swapping out to the hard drive. The results are summarized in "Filters' Performance." Your performance gains will vary depending on your Mac's configuration.

The resize filters for each product work much differently—and often less effectively—from the native Photoshop resize filter. Except for Photoshop, the times given for resizing reflect only the time it took to complete the operation, not the time it took to have a resized image ready to work with (until you regain control of the cursor). You'll find the Lightning Effects resize filter in the Export submenu because the board writes the resized image as a file to disk (which

Gaussian Blur

Original image



Photoshop



Lightning Effects



ThunderStorm



Unsharp Mask

Original image



Photoshop



Lightning Effects



ThunderStorm



The Lightning Effects gaussian blur sample is not blurred as much as the ThunderStorm and Photoshop gaussian blur samples. This is due to the different algorithm used for gaussian blurring in the Lightning Effects software. The difference is subtle but present. I was unable to discern any differences in the unsharp mask samples.

partially explains the longer resize time). Therefore, you must make sure your hard drive has enough space to store the resized image. In addition, you can't resize a selected area.

The ThunderStorm resize also has problems. Reducing an image centers it within your original image. When you enlarge an image you must change the canvas size first or else you'll lose some of the image. The ThunderStorm resize filter can automatically pass the correct dimensions to Photoshop's Canvas Size dialog box, which makes the resizing process easier, but it's still not the one-

step process that it normally is in Photoshop. You can resize a selected area, but the area will always be rectangular.

I also tested the ThunderStorm and Lightning Effects filters to see how accurate they are compared with Photoshop's native filters. The exact results depend on how you're using the Photoshop file, the contents of your file, and the final display medium for your images. When I filtered the image with a native Photoshop filter and then subtracted the filtered image from the same image treated with a ThunderStorm or Lightning Effects filter, I saw minor differences.

Most of the features in Adobe's recently announced Photoshop 2.5 can be accelerated by DSP boards. This new open architecture will eliminate the need for third-party accelerators to duplicate native Photoshop effects. Both SuperMac and Spectral Innovations have stated that they will support this new approach to accelerating Photoshop. Both companies plan to offer performance-enhancing software for other third-party software packages.

The ThunderStorm board was developed by Storm Technology and uses the AT&T 16-bit 16A DSP chip, which is more difficult to program but runs twice as fast as the AT&T 32C chip that is used in the Lightning Effects II board. Storm Technology has also licensed its DSP technology to DayStar Digital. Spectral Innovations has licensed its DSP products to Newer Technology, which markets the boards under the name Image Magic.

—MATTHEW LEEDS

FILTERS' PERFORMANCE

Times are in seconds

Filter	Photoshop	ThunderStorm	Lightning Effects II
Blur *	16	16	20
Blur more	26	15	20
Gaussian blur	117	39	32
Motion blur	203	29	NA
Super blur	NA	NA	21
Sharpen *	17	14	19
Sharpen edges	94	27	NA
Sharpen more	24	15	19
Unsharp mask	417	21	20
Resize	57†	10	23
Rotate‡	185	NA	51
JPEG Acquire			
Photoshop	43	18	49
ThunderStorm	43	18	5
Lightning Effects II	44	18	31
JPEG export	76	21	30

* Both boards' manuals state that the blur and sharpen filters may not be faster on some IIsi and better machines—test results are included only for completeness. However, I did see marginal improvement in the ThunderStorm's sharpen filter on a IIsi.

† Time to regain control of the cursor. ‡ The ThunderStorm has no rotate filter. The rotate filter in the Lightning Effects II is limited to small amounts of rotation. I couldn't rotate much more than 0.5 degrees. The manual says the rotate filter is for straightening scanned images. § The Lightning Effects II crashed when trying to acquire ThunderStorm JPEG files using its JPEG Acquire plug-in.

The Critics' Choice For Best Picture.

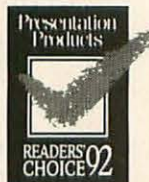
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Video-Titling Software

Comet CG 1.0.3

PROS: Generates broadcast-quality antialiased text over live video; lets you map PICT graphics over text; supports any PostScript or TrueType font; nice transition effects. **CONS:** Incompatible with many video boards; no leading, text rotation, or custom pair kerning; lacks support for TIFF and QuickTime JPEG compression; cumbersome interface; overpriced.

COMPANY: AT&T Graphics Software Labs (317/844-4364). **REQUIRES:** Mac II; 40MB hard drive; 1.4MB floppy drive; 4MB of RAM; System 7; NuVista+ or Video Explorer video board; additional multisync monitor. Recommended: 8MB of RAM. **LIST PRICE:** \$995.



COMET CG BELONGS TO THAT EXCLUSIVE breed of programs that boasts the ability to bring professional-quality video graphics to personal computers. If you make your living editing videos, Comet CG (as in character generator) might seem like something of a bargain: not only is it the best Mac program for generating antialiased text over live video, but it is also reasonably priced compared with dedicated graphics systems. However, if you're a video-editing enthusiast who already knows his or her way around the Macintosh, you're likely to be as astonished by Comet CG's limitations as impressed by its capabilities. One fin short of a G-note buys you too few formatting options, a cumbersome interface, an insubstantial manual, and a few memory and speed surprises.

Because Comet CG does video overlay, it requires a video output device that permits chroma keying (an effect that permits live video to share screen space with Macintosh text and graphics). Unfortunately, Comet CG limits itself even further by supporting two video boards only, TrueVision's NuVista+ and Intelligent Resources' Video Explorer. If you own another board that's capable of chroma keying titles over video—among them Mass Microsystems' ColorSpace FX, RasterOps' ProVideo32, and Video-Logic's DVA-4000/Macintosh—you're out of luck.

And You Thought You Understood Antialiasing

TO ANTIALIAS TEXT OVER VIDEO IMAGES, Comet CG exploits the video board's 8 bits of alpha channel, which permit 256 degrees of transparency for each of the 16 million colors available to the Mac. For example, one screen pixel might be solid

computer-generated blue, another might be translucent blue mixed with underlying video, and a third is pure video. To antialias text, Comet CG softens the outline of each character by varying the translucency of border pixels and allowing the underlying video images to show through in progressive increments.

Comet CG isn't the first Macintosh titler to support antialiasing, an honor that goes to Data Translation's now extinct VideoQuill. However, where VideoQuill provided one get-by antialiasing setting, Comet CG provides nine degrees of antialiasing, ranging from very good to fantastic. The lower settings suffice for commercial video resolutions, which is a good thing because higher settings require gobs of RAM, and I do mean *gobs*. To render a single line of 72-point text at the highest setting requires somewhere in the neighborhood of 12MB of RAM, a steep departure from the program's 4MB minimum. More complicated text and multipage scenarios need even more memory, frequently upwards of 32MB. Unfortunately, Comet CG doesn't offer virtual memory, so there's no chance of taking advantage of empty hard drive space in a crunch. If you don't have the RAM, you're out of luck.

No Perks with This Paradigm

IN TERMS OF FLEXIBILITY AND INTERFACE, VideoQuill was a vastly superior product. VideoQuill supported custom leading and pair kerning, two absolute necessities in any display text program; Comet CG offers one leading setting (automatic) and two kerning options (on and off). VideoQuill let you rotate text; Comet CG does not. VideoQuill was capable of filling text with automated gradations or even live video; Comet CG lets you fill text with a stagnant PICT graphic (no TIFF and no QuickTime JPEG compression), but titles always appear in front of the video image and gradations are absent. Granted, VideoQuill worked only with its own proprietary typefaces, while Comet CG renders any PostScript or TrueType fonts. But the fact remains, if Comet CG can't keep up with a two-year-old product that wasn't able to amass any sales at half the cost, I can't imagine folks breaking down the doors to get hold of the thing.

My complaints don't end here. Comet CG purports to emulate that most sacred of interface models, the page-layout paradigm. But in truth, the program does a pretty lousy job of it. Comet CG offers one tool for creating text, another for editing it, and a third for coloring it. If you want to change block-level formatting attributes—alignment, drop



First-Class Antialiasing, Coach Flexibility

Even on low-resolution 8mm tape, Comet CG does a great job of rendering crisp, clear titles. But because it lacks leading options, the only way to create this specially spaced text was to create each line as a separate text block.

shadows, picture mapping—you have to use still a fourth tool. Importing a picture is likewise unnecessarily complicated. You have to use one tool to draw the picture box, manually choose a command to subscribe—yes, you *have* to subscribe—to a PICT file on disk, crop away unwanted portions of the picture using a second tool, and reposition the picture in its frame using a third tool. This may be the first time in nine years of working on the Mac that I've ever had to read a manual to figure out how to import a graphic.

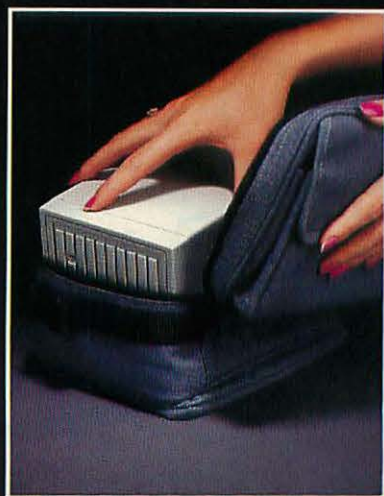
You can preview a single page of text over your live video or render several pages at once and then play the pages in any order. Comet CG offers only three transition effects—replace, dissolve, and a vertical scroll—but they're well implemented and tasteful. You can specify the length of time a page appears on screen and how long the transitions take. What you can't adequately control are the gaps between pages. Comet CG loads each page independently from disk into the video board's RAM, instead of loading all pages at once into the allotted application RAM—if possible—and then swapping them to the video RAM one at a time, which would be much, much speedier. On my Mac IIci with 40MHz cache card, the disk-to-video RAM swapping process took nearly two seconds, or 60 NTSC frames, per page. Even if you have a wicked-fast Quadra 950, you'll experience noticeable delays between pages.

Any Mac program that provides broadcast-quality character generation represents an advancement in desktop video. For video pros who've already made the Macintosh plunge and invested in Comet CG's chosen video technology, this program is a reasonable, though somewhat disappointing, investment. But if you haven't yet purchased a Mac II or better, Comet CG warrants little more than raised eyebrows. And if video is only a hobby, stock away your savings for another day.—DEKE MCCLELLAND

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VOLUME 10 ISSUE NO. 3

Riding the Rails

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9. Heavy-duty tape

individual
railroads.
continued page 2

Emergency Items

1. Aspirin/antacid
2. Band-aids/first-aid ointment
3. Zip-top plastic bags
4. Bottle opener/corkscrew
5. Foldable tote bag
6. Small flashlight
7. Liquid detergent
8. Insect repellent/bite ointment
9. Heavy-duty tape

Leave

TRAVEL^{OWISE}

Riding the Rails

There's no more economical, efficient and fun way to travel in Europe than by train.

To use trains most effectively, plan your progress so you can avoid unnecessary backtracking. Trains are also ideal for day excursions. You can get convenient railroad or regional schedules from your travel agent or from the local office of individual railroads.

Emergency Items

1. Aspirin/antacid
2. Band-aids/first-aid ointment
3. Zip-top plastic bags
4. Bottle opener/corkscrew
5. Foldable tote bag
6. Small flashlight
7. Liquid detergent
8. Insect repellent/bite ointment
9. Heavy-duty tape

Leave Jet Lag Behind

Whether you travel for pleasure or for business, the last thing you want is to waste precious time at your destination feeling overly tired or ill. Here are six simple steps that you can take to help keep jet lag permanently off your itinerary.

1. Avoid the trouble. Arrive at the airport at least an hour before your flight is scheduled.

to depart, so you can check in and get settled with time to spare. If you board a rail airplane when you're overbooked, the abrupt longer change can increase your chances of being unwell.

2. Adjust your timing. As soon as you take off, set your watch to your destination's time zone. It's a simple way to get mentally prepared for arrival.

3. Stay hydrated. Hold a glass of water with you and sip on it as you go. To avoid the dryness of travel, keep a bottle of water with you.

This ever happen to you?

Someone sends you a document and when you pull it up on your computer or print it, it looks like alphabet soup: letters floating off, no formatting, and type that's...that's...what is that Geneva? Courier?

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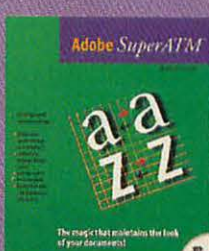
With SuperATM, people can send you documents that you can view, print, even edit, in all their original glory.

Magic?

No, but close. SuperATM creates "substitute fonts" that accurately maintain the look of your formatted text.

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*If you already have Adobe Type Manager, you can upgrade to SuperATM for just \$49. That's \$100 off the suggested retail price.



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Circle 134 on reader service card

Personal Tax-Preparation Software

Andrew Tobias' TaxCut for Macintosh

PROS: Includes "what-if" feature for comparing tax strategies and scenarios; excellent help system; Shoebox command handles leftover receipts; supports 1040PC and electronic filing. **CONS:** Whole-dollar calculations only; interface awkward in areas; only two state-tax versions available. **COMPANY:** MECA Software (203/256-5000). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.2. **LIST PRICE:** \$79.95.



MacInTax

PROS: Attractive display; File Cabinet command handles leftover receipts; supports electronic filing; 15 state-tax versions available; includes Plan mode for estimating 1993 tax liability. **CONS:** Errors can be difficult to correct; 1040PC filing program available only on request. **COMPANY:** ChipSoft (619/453-8722). **REQUIRES:** Mac Plus; hard drive. **LIST PRICE:** \$79.95.



TAX PREPARATION BY HAND IS NOT A task for the faint of heart. This year, there's a competitor to ChipSoft's MacInTax, the leader in the field: Andrew Tobias' TaxCut for Macintosh, ported over from the DOS platform.

Both programs appeared toward year's end in preview versions for entering preliminary data and estimating tax liability. The final editions shipped free to registered users of the preview software shortly after the tax laws and IRS forms were set for the year—in January. Unfortunately, TaxCut's preview version, HeadStart, looks like a product rushed to market, with many basic features not implemented, including tax-data importing, interview help, scratch pads, and the ability to show all forms that are related to a particular item. In contrast, few essentials are missing from MacInTax's preview edition, called Easy Step.

The programs have so much in common that selecting one based solely on features is almost impossible. Both let you choose between manually selecting forms and entering data in whatever order makes sense to you, or submitting to the program's "interview," in which you answer on-screen questions and let the program transfer the data to the proper forms (see "MacInTax Interview"). Data can be actual or estimated, and you can

import existing tax data from Intuit's Quicken or any program that saves in STD (standard tax data) format. Both programs provide on-screen tax help; TaxCut's is especially thorough and contains an excellent Search feature. Both also have memo pads for annotating line items and itemization calculators for recording finer detail. Shoebox (TaxCut) and File Cabinet (MacInTax) menu commands help handle your leftover, oddball tax receipts.

The programs also can run a final review of your return, checking for errors and entries likely to trigger an audit. Using 1993 tax tables and incorporating changes in the tax law, MacInTax's Plan mode lets you see how you'll fare next year. TaxCut goes even further by providing a spreadsheet-style "what-if" form that lets you compare different tax strategies using tax tables from any year between 1988 and 1999 (see "What-If Form"). Both programs print IRS-acceptable forms, as well as related worksheets and notes. MacInTax can also print data directly onto actual IRS forms.

Each program is driven by a detailed tax interview. TaxCut conducts the interview by means of dialog boxes, so you can't summon DAs or switch to other programs until you halt the interview. However, because TaxCut always remembers where you left off, you can exit to the tax form, call up your DAs, and then continue. You can also revisit any section of the interview to examine or change your answers. Revisiting, however, has a severe penalty: you cannot resume the main interview until you again answer every question in the section you're revisiting. Although the TaxCut manual states that you can jump directly to any interview topic (as you can in MacInTax), the feature is not implemented.

TaxCut automatically rounds all numeric entries to the nearest dollar; MacInTax lets you choose between calculating exact amounts or rounding. TaxCut also handles check boxes in a non-standard fashion, which initially caused me some serious problems. When you click in a check box, the box is merely selected; it requires a second click to change the state of the box.

MacInTax's biggest shortcoming is the ease with which you can enter erroneous interview data and the difficulty you'll have correcting the mistakes. For example, since there's no option to delete a multipart line item (such as a depreciation entry), you have to switch to manual-entry mode and edit the form. Similarly, if you answer an interview question incorrectly, you often have to revisit the interview to change your answer. Manu-

MacInTax Interview During the interview, you can see the form and line item that will be affected by each answer. The menus and icon bar remain accessible during the interview.

What-If - Copy 1		22,125	22,125	22,125	22,125
PART I - TAX COMPUTATION					
23. Your spouse over 65 (or blind) (1-4)	25	0	0	0	0
26. If you are working	26	0	0	0	0
27. Standard deduction	27	4,000	4,000	4,000	4,000
28. Taxable income	28	18,125	18,125	18,125	18,125
29. Tax before credits and other taxes	29	1,951	4,204	3,754	1,951
30. Tax credits	30	0	0	0	0
31. Other taxes	31	4,204	4,204	4,204	4,204
32. 1992 tax payments	32	0,000	0,000	0,000	0,000
Tax due (refund)		-1,951	0,000	-3,754	-1,951
For what tax year is each column?					
		92	92	92	92

What-If Form This TaxCut worksheet makes it easy to compare alternate tax scenarios, as well as plan for coming years.

ally correcting the affected items often doesn't work—or isn't allowed.

Because state tax forms often rely heavily on information from federal returns, TaxCut and MacInTax sell separate programs for calculating state returns. For 1992, TaxCut offers only New York and California versions; and many users complain about the difficulty of reaching ChipSoft tech support. MacInTax has programs for 15 states.

Both companies guarantee the accuracy of their programs' calculations. If a miscalculation results in an IRS penalty, the software publisher will pay the penalty. The programs also support electronic filing, for an additional fee, as well as the new 1040PC format for data-only submissions (included with TaxCut and available on request for MacInTax).

Neither program lives up to my expectations. This year's MacInTax seems more difficult to use than last year's version, despite the more attractive interface. TaxCut's weak HeadStart Edition and its lack of a jump-to-interview-topic feature made me wish the company had taken an extra month or two to get its act together. Even so, using either program is preferable to completing complicated taxes by hand—and still a bargain.

—STEVEN A. SCHWARTZ

Project Management

MacProject Pro

PROS: New scheduling and formatting features; improved resource-management and analysis tools; well-designed interface; easy to customize; great manual. **CONS:** Limited integration between program charts; multistep scheduling process. **COMPANY:** Claris Corporation (408/727-8227). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.5. **LIST PRICE:** \$599.



MACPROJECT PRO IS DESIGNED TO help people who are responsible for finishing projects on time and on budget. Whether it is the right tool for you depends largely on how you like to visualize information. MacProject Pro's main organizing chart, a PERT network chart, shows each task as a separate box connected with straight lines to related tasks; MacProject Pro is a well-designed and useful tool for seeing tasks displayed this way. However, if you prefer seeing tasks arrayed in a Gantt chart, in which tasks are displayed as bars that stretch across a time line, MacProject Pro can be a frustrating program to use.

What's New

MACPROJECT PRO IS A SIGNIFICANT upgrade to MacProject II, providing tools for better organization and entry of data, enhanced display capabilities, much-improved resource management, more-sophisticated scheduling features, more-flexible printing options, better tools for tracking the progress of a project, easier data import and export, and support for System 7's publish and subscribe and Apple events. Better yet, MacProject Pro has the same kind of clean design and understandable menu structure that users of Claris's FileMaker Pro or ClarisWorks would expect, a boon for the beginning project manager.

MacProject Pro offers only a few well-chosen ways to enter and display data. The Schedule Chart, a PERT diagram, is the heart of the program. You can easily add annotations, graphics, and notes to the chart to quickly communicate what needs to get done and who is going to do it. The new Outline view is a hierarchical outliner that is most useful for quickly organizing a project from the top down. The enhanced Task Timeline is a Gantt chart that shows when tasks occur over the life of the project by displaying each task as a horizontal bar against a calendar grid.

MacProject provides four views that help you focus on the resources you'll be using to complete the project. The Resource Timeline shows the duration of time that each resource is allocated to a particular task. The Resource Table lists all the assigned resources in a spreadsheet format. The Resource Histogram shows the work load for each resource, highlighting in red the periods when someone is being asked to do too much at once. The Allocation table is a spreadsheet that lists all the resources you'll be using; it groups them by task and calculates the cost of each resource for each task.

Finally, MacProject Pro provides three views that help you get an overall grasp of your project. The Cash Flow Table provides a chronological summary of the project's costs and income. The Dependency Table lists all the tasks in your project and how they relate to each other. The Project Overview is a single-page report that lists the number of tasks in the project, the planned start and finish dates, the planned costs, and other project details.

Operating Constraints

BUT EVEN THOUGH MACPROJECT PRO provides all the essential tools for managing a project, comes with a terrific manual, and has a relatively simple interface, I found its architecture occasionally confining. Scheduling tasks and changing dependencies between them, something you do a lot when refining a project plan, requires several steps and multiple charts. I was often unable to work directly in the views that I found most useful, the Gantt and outline views, and was forced instead to return to the PERT network diagram or a spreadsheetlike tabular view.

The outliner is a useful place to start brainstorming and organizing a project. Once you finish a rough outline, howev-

er, you must move to the Schedule Chart to schedule the tasks, then move to the Task Timeline to see how the tasks distribute themselves over time.

To rearrange the order of tasks, or add new tasks, you must go back to the Schedule Chart and make changes, or return first to the outliner, add new tasks, then go to the Schedule Chart and schedule them. In either case, you cannot work directly in the Timeline's Gantt view.

To change the dependencies between tasks, or change the lag time between tasks, you must use the Dependency Table, which lists all data in tabular form; or you can go to the Schedule Chart, select the dependency line between two tasks, select Lag Time from the Edit menu, and change the dependency and lag time. To see how this changes the distribution of tasks over time, you must go back to the Task Timeline, making what seems like a simple change into a multiple-step process.

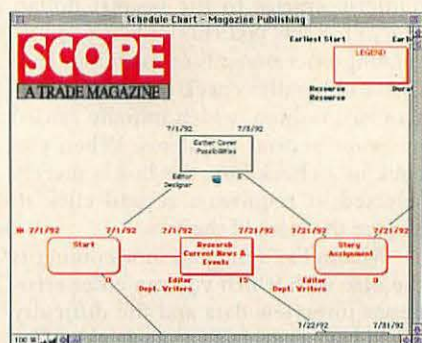
I found the program constraining in several other ways. You're limited, for instance, to one duration scale for the entire project—either minutes, hours, days, weeks, or months. That means that if you've specified days as the most useful measure of duration for entering resource allocations or task duration, you'll also have to use them for lag-time calculations.

I wanted to display milestone dates along with my Task Timeline, but MacProject Pro limits your formatting choices to changing the time-line bar formats and displaying the task names next to these bars.

Managing MacProject Pro

MACPROJECT PRO FITS NICELY BETWEEN scheduling programs like AEC Software's FastTrack Schedule 2.0, which allow the elegant creation of useful charts but offer minimal resource-management capabilities, and higher-end packages like Microsoft Project 3.0 and Scitor Corporation's Project Scheduler 5.0, which provide capabilities for managing more tasks per project and more resources per task as well as offering more reporting capabilities. I'd recommend MacProject Pro for people who are managing midsize projects (Claris recommends using no more than 500 tasks and 50 resources per task) and who particularly like the PERT diagram view of a project. For those who prefer Gantt views but don't need to manage resources, I'd recommend AEC FastTrack Schedule 2.0. For those who do need to manage resources, I'd recommend spending the extra money and time needed to master Microsoft Project 3.0.

—LIZA WEIMAN



The Heart of MacProject Pro In the Schedule Chart view, you schedule tasks, create dependencies, and set lag times. Critical tasks are highlighted in red; the small blue square under Gather Cover Possibilities at the top can be expanded into the electronic equivalent of a sticky note, useful for annotating charts.

How Butterflies Transform

The butterfly passes through several stages in its glorious transformation from egg to the completed creature that we all visualize as the butterfly. The adult female lays between one hundred and several thousand eggs throughout her lifetime each with the potential of becoming an adult butterfly itself.

Each egg, so tiny that it can only be seen by the human eye with the help of a microscope, is laid on or near a plant on which the newly hatched grub will be able to feed. These eggs are often green or yellow, but can also be found in shades of blue or red, each with a shell-like design covering it.

Usually in the spring or summer a tiny caterpillar, or grub, will hatch from the egg. This wormlike creature almost immediately begins to feed as it will consume the majority if not all of its nutrients during this phase of its life.

The caterpillar will continue to eat until it has eaten so much that its skin can no longer contain the newly acquired mass. The skin then bursts and the caterpillar will shed it in order to have it replaced by a newer and larger one. This process continues for weeks as the caterpillar increases in size, several times its original mass.

Often during the time of fall, the caterpillar will then either spin a silken pad from which it suspends itself by its hind legs or it will fasten its body upright by silken threads to a twig creating a chrysalis or exposed pupa. Usually after spending the winter months dormant, the final stage of transformation will take place.

The shell of the chrysalis is broken open and the creature that emerges is barely recognizable as the butterfly that it will become. Its wings are crumpled and kept close to its moist limp body. It will remain clinging to the cocoon or a nearby branch as its form gradually begins to become dry and firm.

It moves its wings slowly at first with little strength but as they dry it is soon ready to take flight. The creature that ascends into the air has been through its final stage of development and is now the completed butterfly. This butterfly is now called the imago, or perfect insect.

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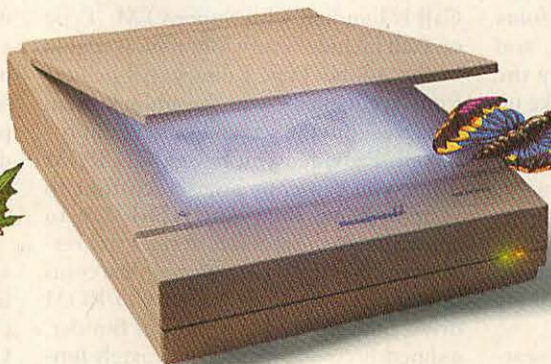
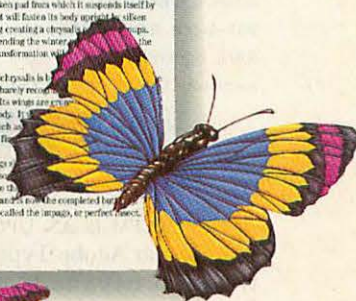


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Font-Substitution Utility Pack

SuperATM

PROS: Generates and prints smooth approximations of most fonts in the Adobe Type Library; includes entire screen-font library on CD ROM; protects against Courier substitution during printing. **CONS:** Doesn't work with most non-Adobe fonts; incompatible with special characters. **COMPANY:** Adobe Systems (415/961-4400). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.5. Recommended: CD ROM drive. **LIST PRICE:** \$149.



SUPERATM IS AN UPGRADE TO THE popular Adobe Type Manager utility, which lets you view Adobe-brand PostScript fonts on screen and output those fonts at high resolutions even when the corresponding printer fonts are unavailable. It doesn't work with non-Adobe PostScript fonts—including fonts from Agfa, Monotype, Bitstream, and many others—and it supports only the handful of TrueType faces that make up the Apple Font Pack (see *Reviews, Macworld*, March 1993). But if you've ever wanted to expand your typeface library or open other people's font-infested documents on your machine without having to reformat, SuperATM qualifies as an outstanding advancement in technology and a tremendous value to boot.

To work its magic, SuperATM scatters a variety of programs and resource files throughout the System Folder, none of which is actually named SuperATM. The heart of the little network is the

familiar ATM control panel, now promoted to version 3.5. In previous incarnations, ATM followed a two-step approach: first, it assembled a list of the screen fonts available to your system, then it generated smooth outlines for those faces on the fly by referencing the mathematical outline definitions contained in the corresponding printer fonts. ATM 3.5 goes a few steps further. If it doesn't find a printer font, it consults a hefty, 1.4MB database containing font metrics—character size, pair kerning, and proportional spacing information—for 1300 faces from the Adobe Type Library. Once ATM 3.5 locates the desired metrics, ATM blends two multiple-master fonts—one serif and the other sans serif—according to a recipe found inside the database, in order to fashion a reasonable facsimile of the desired typeface. ATM 3.5 can both display the result on screen and print it at full resolution to a variety of PostScript and non-PostScript printers.

An Adobe CD ROM named Type on Call is bundled with SuperATM. Type on Call includes every font now available in the Adobe Type Library. All printer fonts are locked—you can unlock them for a fee—but the screen fonts are unprotected. Provided you have a CD ROM drive, you can copy any screen font to your system, then use ATM 3.5 to approximate the typeface at sizes and resolutions that the screen font can't accommodate. If you don't have a CD ROM drive, SuperATM bundles Font Builder, a superbly convenient but ultimately limited utility that lets you generate screen fonts for a mere 31 font families. The majority of these are the handiwork of Adobe's in-house type staff; the rest are

licensed in the public domain. Until big licensors like ITC, Monotype, and Linotype-Hell jump on board, Font Builder is a swell idea with a stunted potential.

SuperATM proves itself invaluable when editing documents created on different machines. Even without the appropriate screen fonts, ATM 3.5 generates outlines for Adobe-brand typefaces that it finds inside a document. For example, suppose a design-sensitive associate formats a weekly memo in Berthold Bodoni Antiqua and asks you to perform the old once-over for the sake of accuracy. You appreciate the font's linear composition and classic stylings, but you don't want to hunt it down and load it on your machine. With SuperATM, you can open the memo, edit it, and save the file, all without upsetting paragraph breaks, pagination, or any other formatting attributes.

SuperATM's emulations are not meant to take the place of true printer-font definitions. They're only intended to be placeholders, props to hold up your documents when nothing better is available. Having said that, many users will have a hard time telling ATM-generated serif and sans serif text faces from their printer-font originals. Slab serif fonts, display faces, and cursive scripts don't fare nearly as well, though the font metrics in every test I tried were right on.

Sadly, ATM 3.5 has no information about symbol fonts (such as Zapf Dingbats and Mathematical Pi) and special-character fonts (such as Utopia Expert Collection and Helvetica Fractions). If special characters appear in a document, ATM 3.5 uses the default screen font, so they appear as bitmaps. This means that more than 10 percent of the fonts in the Adobe Type Library are incompatible with SuperATM. A more flexible font-rendering algorithm is needed. For example, if a font includes the *ffi* ligature, as do all of the Expert Collections, why can't SuperATM blend and merge the *f* and *i* outlines from its master designs to create a single character? If this is impossible, Expert Collection master designs should be included with SuperATM.

A local typesetter I know made an interesting comment. He worried that SuperATM might do too good a job of emulating a font, and therefore make it difficult to tell if he had typeset a page using the proper printer font or the SuperATM emulation. But if you've ever reproduced thousands of copies of a document only to notice too late that a line of text had defaulted to Courier, or worse, bitmapped, you'll appreciate SuperATM. No SuperATM emulation is perfect, but in most cases you'll be the only one who notices the difference.—DEKE MCCLELLAND

Real Adobe Printer Fonts	SuperATM Substitutions	Overprinted (Font Metrics)
Dom Casual	Dom Casual	Dom Casual
<i>Caxton Italic</i>	<i>Caxton Italic</i>	<i>Caxton Italic</i>
Linotext	Linotext	Linotext
Garamond Condensed	Garamond Condensed	Garamond Condensed
Folio Light	Folio Light	Folio Light
<i>Shelley Script</i>	<i>S helley S cript</i>	<i>Shelley Script</i>
Serifa Black	Serifa Black	Serifa Black

Great Font Forgeries The left column shows seven printer fonts from the Adobe Type Library. The middle column shows the same typefaces generated by SuperATM without printer-font definitions. ATM 3.5 works best when rendering serif (Caxton Italic, Garamond Condensed) and sans serif (Folio Light) text faces. Slab serif (Serifa Black) and display faces (Dom Casual) suffer, while scripts (Shelley Script) and other decorative styles (Linotext) are unrecognizable. However, as shown in the right-hand column, which has the printer fonts superimposed on the ATM substitutions, the font metrics are the same even when the approximations look different from the originals—letterspacing and leading remain unaffected, thus ensuring proper copyfitting.

SHARP OUTPUT FOR YOUR BIG IDEAS



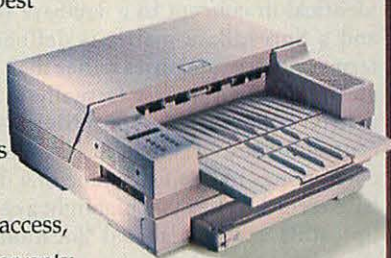
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Data-Analysis Program

SpreadBase 1.0.1

PROS: Unique combination of database and spreadsheet functions; designed for easy modification of data views; accepts and formats SQL data through Clear Access. **CONS:** Big program, big files, slow operation; modest assortment of graph types; cranky text-based macro language; meager documentation. **COMPANY:** Objective Software (415/306-7410). **REQUIRES:** Mac II with math coprocessor; 5MB of RAM; hard drive; System 6.0.5. **LIST PRICE:** \$695.



SPREADBASE IS THE MOST POWERFUL business-analysis tool yet produced for the personal computer. The program aims to eliminate the rather artificial distinction between the flat-file database (really just one sort of table) and the spreadsheet (just another sort), and it succeeds. If you need multiple, flexible views of business data, SpreadBase is an outstanding product. The only drawback is that SpreadBase would work better in a world of 200MHz processors and gigabytes of RAM, but for power users it's worth a close look right now.

Categorical Superiority

SPREADBASE DESCRIBES ITSELF AS CATEGORY-BASED modeling, in contrast to spreadsheet modeling in which quantities are identified simply by locations in a grid. A category in SpreadBase is almost identical in concept to a database field, and a SpreadBase matrix is defined in terms of these categories rather than single items. The matrix (actually a 3-D matrix) rather than the spreadsheet is the central feature of SpreadBase; each cell corresponds to one field value of a database record. When you highlight a cell in SpreadBase, a line labeled "location" in the matrix view shows the names of the rest of the data fields associated with the database record connected to that cell (see "Big Firm Matrix").

Setting up a SpreadBase matrix is more like defining a database than formulating a traditional spreadsheet model. This means it takes longer and requires more thinking at the outset. The benefits of this additional effort, however, are considerable. First, formulas in SpreadBase are defined in terms of category names, for example "Profit = Revenue - Expenses" rather than $C5 = B5 - A5$. Second, you can do any conceivable rearrangement of your work by selecting categories in a matrix-view dialog box, and everything rearranges itself magically (and correctly)—

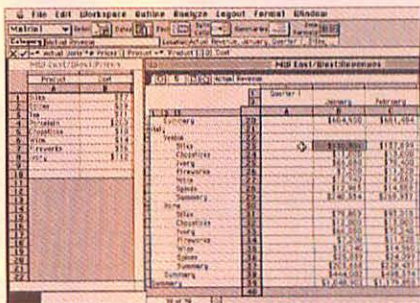
including formulas. From the same basic data, you can have the matrix highlight, for example, sales by quarter, sales by region, or any of the other views beloved of product planners, budgeters, and marketing managers. Highlighted data roughly corresponds to cross-tab views of data, except that SpreadBase implements a sophisticated type of view-to-view data linking and the cross-tab function works across all linkages. All this data is further organized in a convenient outline mode, and SpreadBase offers all the expected math, financial, statistical, and other functions for analysis.

SpreadBase automatically generates sets of graphs corresponding to its cross-tab views, albeit from a somewhat austere set of basic graph types (area, bar, pie, column, line, and scatter—all of them 2-D). The graphs aren't fancy, but they set a new standard in ease of use. Once you have asked the program for any graph at all, you can see any other graph just by selecting categories from pull-down menus in a graph-definition dialog box. This technique is so superior in practice to the standard spreadsheet highlight-the-cells method, you'll wonder why every program doesn't use it. Well, the other programs, particularly spreadsheets, don't do it because they don't "know" what the data means. The extra time needed to set up a SpreadBase matrix, compared to an Excel spreadsheet, is paid back as soon as you start looking at a few comparative graphs.

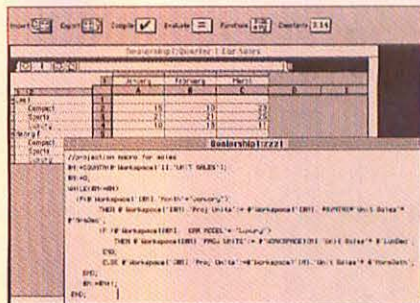
Does Size Matter?

SPREADBASE ITSELF TAKES UP ABOUT 3MB and runs small projects in 5MB of RAM, but the program really calls for 8MB for general-purpose use under System 7. Files are similarly substantial: a 12 by 20 array that would constitute a 5K Excel file becomes a 100K SpreadBase matrix. Because of the overhead associated with the implicit database attached to your data, you can expect this level of file-size inflation for most projects. Most big programs aren't fast, and this one isn't either. Although the format makes direct comparisons difficult, an action corresponding roughly to the recalc of a 10 by 10 matrix (changing a term in one linked sheet and observing a change in totals in a matrix) takes 20 to 40 seconds on a IIci, depending on setup details.

Other negatives are SpreadBase's ModelTalk macro language, documentation, and help. ModelTalk is a text-only (there are no watch-me-style macros), pseudo-code-like language with uniquely annoying variable-name syntax (see "Severe Macro-variation"). Here's the problem: this program's main features are



Big Firm Matrix The matrix view, effectively a 2-D view through a 3-D stack of database records, is the central data document in SpreadBase. Note the formula associated with this cell, expressed in terms of field names rather than cell addresses.



Severe Macro-variation SpreadBase now has the unenviable distinction of being the only business-analysis program with a fussy, text-based macro language. See all those little periods and single quotes in the expression? They're crucial.

most valuable to financial officers and executives, who seldom have a real programming background. The help stacks included with SpreadBase are mostly an online version of the documentation, and the documentation skimps on crucial areas (error messages, for example). It would also be good to have more documentation on the numerous small glitches that arise translating files in and out of Excel and SYLK formats.

Rating this program is a bit of a problem. If you're the person your company flies out to the head office with a PowerBook 180 to work on divisional budgets, it's an honest four stars, missing the top rating only for sluggish performance, hastily written documentation, and programmers-only macro language. If you're balancing a checkbook on a Performa 200, SpreadBase would rate about one star. If your needs are more complex but are still below top power-user levels, you might be better served limping along with Excel's own cross tabs or buying the admirable special-purpose cross-tab program DataPivot from Brio Technology. But if you currently have lots of linked spreadsheets, are constantly modifying them, and have everyone in the company looking to you for answers, SpreadBase is what you need.—CHARLES SEITER

[illegible]

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 CHARGE™ (FTB) **\$19**
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abcdefghijklmnopqrstuvwxyz CHARGE™
 NEWTRON™ (IC) **\$29**
 ABCDEFGHIJK
 ABCDEFGHIJ OPEN
 QWERTY™ (IC) **\$29**
 MAC
 PC
 LEITRASET™ RAGTIME™ **\$19**
 ABCDEFGHIJKLMNOP12345

Financial-Planning Software

WealthBuilder 2.0

PROS: Easy to use; keeps investor goal-oriented; extensive database of investment options.

CONS: High monthly maintenance costs; sophisticated investors will outgrow program; investment recommendations subjective and unproven.

COMPANY: Reality Technologies (800/346-2024). **REQUIRES:** Mac Plus; hard drive; modem for online database; System 6.0.5.

LIST PRICE: \$79.99.



WEALTHBUILDER 2.0 CAN HELP YOU make your money grow. This easy-to-use program calculates your net worth, tracks your household budget, helps you attain financial goals, and advises you on different investment options.

After the initial setup, you probably won't have to spend too much time entering personal financial data. To set up, you specify your investment philosophy (from Very Conservative to Very Aggressive), enter full information on all sources of income, the money you owe, the cost and worth of your investments, and the value of your personal property and residences. WealthBuilder calculates your net worth and annual income.

For setting up a household budget, you list your income, expenses (including taxes), and savings. WealthBuilder is not a checkbook-management program, though, and you must calculate income and expenses first; however, WealthBuilder can import this data from Intuit's Quicken, Survivor Software's MacMoney, and MECA Software's Managing Your Money.

WealthBuilder helps you work toward financial goals such as retirement, a house purchase, or a vacation. You enter the amount of money you'll need, how much money you have allocated to savings, and financial assumptions such as inflation and interest rates. WealthBuilder suggests how much to allocate each month. Each time you use the program, it charts your finances and tells you how close you are to your goal.

Once you know where you stand financially, the question remains: Where do you invest your money? This is where WealthBuilder shines. It includes a massive database (10.4MB of hard drive space) of possible investment vehicles (over 5000 stocks, 6000 bonds, and 2500 mutual funds). WealthBuilder helps you find the right investment. For instance, you can find conservative mutual funds that have increased in value for five con-

secutive years, high-tech companies with consistently strong earnings, or high-yield high-risk bonds. The program presents you with a list of investments that meet your criteria. Click on the name of an investment, and you see three pages of detailed financial data.

Since stock, bond, and mutual-fund information gets stale quickly, the data that comes with the program is already out of date by the time you load the program. You can update WealthBuilder's database monthly via modem (generally through a local phone call). Updating the full data set takes about an hour with a 2400-bps modem. The first month of updated data is free; after that, you pay \$9.95 a month for updated mutual-fund data and unlimited access to stock option and mutual-fund quotes, or \$17.95 a month to update all stock, bond, and mutual-fund data. The online system also gives you access to current stock, bond, and mutual-fund prices (delayed 15 minutes) as well as a brief summary of current market activity. When you log on to the database, WealthBuilder automatically updates the value of the stocks, bonds, and mutual funds in your portfolio. Unfortunately, the database can't chart the stocks, and the online system won't give you current news (including earnings changes) on individual companies—information that is often crucial in making an investment decision. You can receive quarterly updates by mail for a fee (\$119.95 for mutual-fund data; \$199.95 for all stock, bond, and mutual-fund data).

WealthBuilder suggests how you should allocate your investments (what percentages to put in stocks, bonds, precious metals, and so on), but this is just one opinion—take the program's advice at your own risk.

WealthBuilder includes a portfolio manager; however, it's extremely limited and gives you only the barest details on your investments. You can print other reports (net worth, budget, and so on) but you can't customize them or even use the fonts installed in your system.

The program is easy to use and makes excellent use of the Mac interface. The extensive online tutorials were written by the editors of *Money* magazine covering such topics as retirement, stocks, insurance, and estate planning. If you need help with the program, toll-free technical support is knowledgeable and is available six days a week.

WealthBuilder forces you to think about your money and helps you develop an investment plan. It is a good program for beginning investors, but more-sophisticated investors will want more.

—SAUL D. FELDMAN

Automatic Disk-Compression Utility

TimesTwo 1.0.1

PROS: Compresses all files; fully transparent operation; no decompression utility needed.

CONS: Doesn't work with partitioned disks; copy-protected installation master; requires special crash-recovery steps; awkward full-disk handling. **COMPANY:** Golden Triangle Computers (619/279-2100). **REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.4. **LIST PRICE:** \$149.



UNTIL RECENTLY, AUTOMATIC DATA compression for the Mac required system extensions, control panels, and special-case handling for some applications. That's because compression utilities were designed as add-ons to the Mac Operating System. TimesTwo is the first Mac compression product to bypass such inconveniences, a feat it accomplishes by operating at the disk-driver level rather than as an OS add-on, using the same algorithm as the MS-DOS utility Stacker, a popular PC driver-level compressor.

The installation procedure is straightforward: you start up from TimesTwo's copy-protected installation master disk, select the hard drive to be converted to a TimesTwo disk, and stand back. The installer first runs diagnostic tests to ensure your drive and SCSI connections are reliable, then it compresses all data on the drive in place. When you next restart, the Finder shows the hard drive as being twice its former capacity. You use the drive normally—the TimesTwo driver automatically compresses all it writes and decompresses all it reads.

Except for speed, operation with a TimesTwo-compressed drive is completely transparent. The Finder reports the expanded size of files, avoiding size ambiguity problems affecting some applications under OS-based compressors. When you copy files from a TimesTwo drive to a non-TimesTwo drive or floppy disk, they arrive in uncompressed form; similarly, communications programs always see uncompressed data when transmitting files from a TimesTwo drive. The TimesTwo driver is self-contained on each drive, so you can use a TimesTwo-compressed drive (or removable cartridge) on another Mac without installing any special extensions or utilities.

The faster the CPU, the faster TimesTwo's CPU-intensive compression algorithm runs. In tests Macs with 68000 or 68020 processors took about twice as long under TimesTwo for most I/O tasks

continues

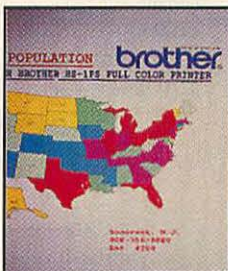
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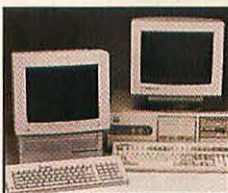
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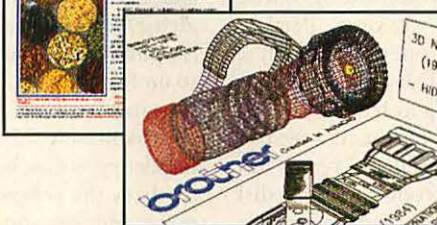
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(such as copying files, launching applications, and saving data). Delays were far less noticeable on 68030-based Macs; a IICI ran only 15 percent slower on average. Most users will probably find performance on the Mac Classic and PowerBook 100 unacceptably slow.

Data-compression efficiency varies with the type of data no matter what utility you use. Files previously compressed by another utility won't compress further. TimesTwo is smart enough to recognize uncompressible data and leave it as is, so you don't pay a time penalty for accessing such data.

TimesTwo does have its limitations. It doesn't work with partitioned disks, and it doesn't let you swap a removable TimesTwo cartridge without restarting. The amount of available space on a volume is only an approximation, based on the compressibility of data already on the disk. For an accurate gauge of available space, you must run the TimesTwo installer again to "verify" the drive. If the estimate is inaccurate, applications crash if they run out of physical space during a save or copy operation. TimesTwo issues a series of warnings when space falls below 3MB. However, tests probing TimesTwo's disk-full behavior sometimes resulted in application or system crashes despite these warnings. Particularly for unattended operation (such as copying a large folder), avoid saving to a TimesTwo disk that's nearly full.

Any time you experience a system crash, you're supposed to rerun the TimesTwo installer from the floppy disk to validate the disk before using it again. The validation step is mandatory; according to Golden Triangle, restarting directly from the hard drive can result in corrupted files. While you can perform this validation step using a copy of the TimesTwo utility, you can install TimesTwo only from the copy-protected original master. Reinitializing a drive to restore from a backup, for example, requires reinstalling TimesTwo from the original master. This could be a problem for users who need to reinstall TimesTwo while on the road. If you forget the disk at home—or, heaven forbid, lose it—and need to reinstall, you're out of luck until Golden Triangle gets you a new one. You could, of course, reinitialize the hard drive with its normal driver, but chances are you won't be able to restore many of your files from backup because there won't be room on the lower-capacity hard drive.

Golden Triangle says a future TimesTwo release will address these limitations. Even in its current incarnation, though, you may find TimesTwo's transparency compensates for its quirks.—MEL BECKMAN

Mail-List Management

AccuZip6 1.5.2

PROS: Full featured; reasonably priced CD ROM updates; toll-free technical support. **CONS:** Slow; doesn't work in background; documentation rife with typos; many user-interface violations. **COMPANY:** Software Publishers (714/846-1908). **REQUIRES:** Mac Plus; 4MB of RAM; CD ROM drive; System 6.0.5. **LIST PRICE:** \$899.



ACCUZIP6 IS BILLED AS A PROFESSIONAL-LEVEL mail-management system. At its most basic, AccuZip6 stores mailing lists, but unlike database applications, it lowers your postage costs by cleaning up lists; eliminating duplicates; and preparing all the forms, sack tags, and labels required for first-, second-, and third-class bulk mailings. Nothing else on the market is nearly as comprehensive (and the lack of competition might partially explain its many problems).

It's possible to import addresses from almost any existing database because AccuZip6 allows you to specify the delimiters. AccuZip6 can even split name and address components contained in a single field. However, AccuZip6 incorrectly splits suffixes such as Jr., Sr., III, and so on from names. On my 8MB Mac IICI running System 7.1, AccuZip6 imports approximately 75 records per minute. Importing is slow because AccuZip6 standardizes the records by identifying discrete address components, correcting abbreviations and capitalization, then placing the components in the order preferred by the U.S. Postal Service.

You can manually add records by typing just the recipient's name, street address, and zip code. Because AccuZip6 standardizes as you enter, there's no need to correctly spell the street name or use proper punctuation. Furthermore, AccuZip6 provides the correct city and state when it codes the record—adding the zip+4, carrier route number, and PostNet bar code—by consulting its CD ROM, which contains every valid postal address in the United States. Standardization is almost instantaneous, but since on-the-fly coding takes up to 30 seconds if you have not entered a valid street address for the zip code, on-the-fly coding should be a preference item so as not to interrupt data entry.

You can batch-code either during or after importing. My system was able to code roughly 430 records per hour. Unfortunately, this time-consuming process can't be performed in the background.

About 10 percent of my records were undeliverable according to AccuZip6. Still, many acceptable records were "corrected" in error. For instance, "100 Main St., 15th Floor" was changed to "100 Main St STE FLOOR." Software Publishers is aware of this problem and promises a fix soon, though coding performance will most likely continue to suffer as long as AccuZip6 is written primarily in ACI US's 4th Dimension.

AccuZip6's closest competitor, Semaphore's ZP4 (*Reviews, Macworld*, May 1992), can also standardize and code addresses, but AccuZip6 goes much further. It presorts your addresses and prints labels in the order required to take advantage of significant postage discounts. It then prints the required CASS (Coding Accuracy Support System) forms and sack tags. However, if you're unfamiliar with postal rules, rates, and regulations, the documentation isn't illuminating. In fact, it's so haphazardly organized and full of typos that it's being rewritten.

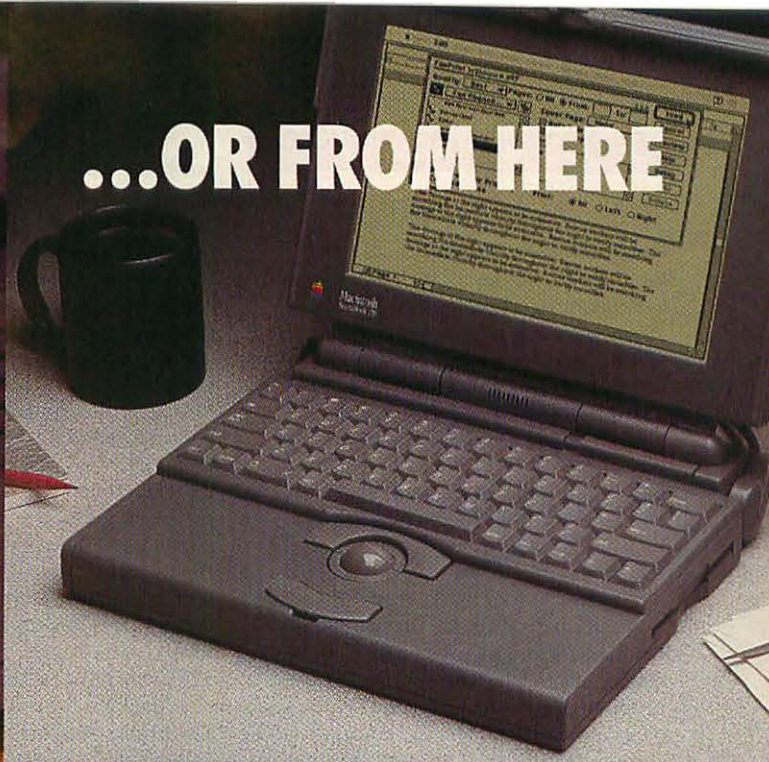
Software Publishers should also focus on AccuZip6's egregious user-interface violations. AccuZip6 is inexcusably modal: switch from importing to entering records, for example, and you get wholesale menu changes, which destroy any semblance of consistency. There are all sorts of other nits to pick, too. For instance, pressing the return key doesn't initiate default buttons outlined in bold; check boxes are used where radio buttons should be; and, amazingly enough, there's no New option in the File menu. To create a new database, you have to hold down the option key while double-clicking on the AccuZip6 application icon. How's that for intuitive?

Software Publishers deserves credit for greatly raising expectations for Mac mail-management software. Although ZP4 codes almost 10 percent faster, its upgrades are more costly (\$125 per quarter versus \$200 per year), printed documentation is nonexistent, and the feature set is not nearly as complete. Nonetheless, with AccuZip6's inadequate documentation and confusing user interface, I hesitate to recommend this version unless your mailing needs are extremely pressing and you're willing to spend lots of time on Software Publishers' knowledgeably staffed, toll-free, technical-support line. Software Publishers clearly understands the needs of bulk mailers, and in fact plans to release \$100 modules for telemarketing, real estate, and mail-order professionals. If they place as much emphasis on clarity and ease of use, I'm sure AccuZip6 will eventually deliver more postage savings than headaches.

—OWEN W. LINZMAYER

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Scientific Data Visualization

MacPhase 1.2

PROS: Low-cost, flexible data visualization for science and engineering; large assortment of mathematical tools; good interface to picture formats and programming languages.

CONS: Assumes some user sophistication.

COMPANY: Otter Solution (315/768-3956).

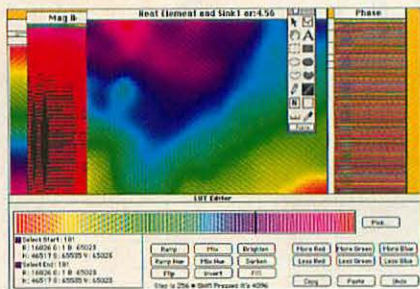
REQUIRES: Mac II; 2MB of RAM; System 6.0.7. Recommended: hard drive; 256-color monitor. **LIST PRICE:** \$159.



A FEW YEARS AGO, DOUG NORTON needed a program that would be able to represent, graphically, imperfections and distortions in a mirror surface. He wrote a program that could exhibit 2-D color-scale or gray-scale data (that is, it scaled a 2-D array of numbers to represent the numbers as color or intensity values), and in fact it provided a good representation of the small blips on mirror surfaces that result in phase differences in light reflected from different parts of the mirror. That original work has now been expanded to become a commercial program with a large assortment of 2-D data-manipulation facilities. It's one of the few authentic bargains in science software.

MacPhase has a feature set you would normally associate with programs that cost \$895 or so. Besides native, binary, and text files, and the expected PICT and TIFF formats, you can work with PostScript EPS files, Windows bitmaps, and files from Mathematica and MATLAB. Once the files are imported, you have a choice of seven windowing functions, with Hamming as the default. You get ten standard filters (edge, blur, Laplace, and so forth) with explicit control of filter matrix elements. The Math menu lets you perform calculations of any level of complexity on view windows (the program takes file names as the array names), and there's a pop-up RPN calculator for simple calculations (adding arrays, multiplying by a constant). The Transform menu offers four modes of Fourier transforms (on a Mac IIci, transforming a 128 by 128 array takes about six seconds).

MacPhase also has nine built-in types of gray-scale representation and a large assortment of stock lookup tables, but one of its principal strengths is a well-planned lookup-table editor. In a few minutes you can generate a custom lookup table to highlight salient data features in any given window. In fact, between the lookup-table editor and the Math menu, you can readily surpass the special effects available in Adobe Photoshop (MacPhase is faster, too). MacPhase generates histograms and statis-



Electric Crayons The lookup-table editor in MacPhase is delightfully easy to use; it's actually more intuitive than the color-scheme modifiers in professional graphics programs.

tics on visualized data sets, and also does 3-D contour and vector plots besides the usual color and gray representations.

Otter Solution is a small operation, with the disadvantage that you have to go to America Online or Otter's Internet board for support, but with the corresponding advantage that the support comes from Doug Norton. The program and manual assume that you know the function of most image-manipulation operations, and that you might want to tinker with interface source code (thoughtfully provided). But even if you don't have much experience in data representation, you could be very happy with MacPhase as your only image processing tool.—CHARLES SEITER

Executive Information System

EISToolKit 2.0

PROS: Wingz-based scripting easy to use; Clear Access for Mac/SQL connectivity. **CONS:**

Slow; Wingz-based approach calls for workaround.

COMPANY: MicroStrategy (302/427-8800).

REQUIRES: Mac IIx; math coprocessor; 5MB of RAM; hard drive; System 7. **LIST PRICE:** \$1995.



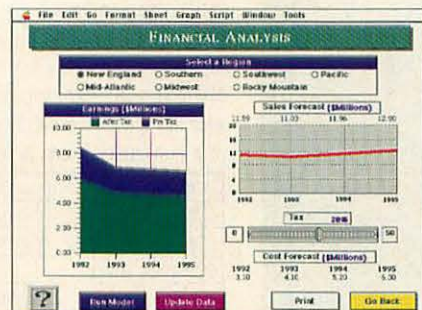
EISTOOLKIT IS A DEVELOPER'S ENVIRONMENT for creating an executive information system (EIS). Like executive word processors, EISs are designed on the assumption that business decision-makers are irrevocably complexity-impaired and should see a minimum of on-screen database choices at a time. EISToolKit helps you develop applications for this audience.

MicroStrategy's approach is ingenious. This product consists of Wingz, Clear Access plus ClearLink (both are included), and a set of 100 or so Wingz scripts that represent MicroStrategy's programming effort. These scripts in turn give you an environment in which you can create the elements of an application (layouts, buttons, graphs, links to databases, and data views) simply by calling commands from a Tools

menu and following some dialog box choices. This simple scheme works much better than you might expect.

The HyperScript language in Wingz is well designed—there's not much you can't do with it, and its performance is acceptable if not exactly quick. The command set and facilities are well designed for easy application construction. Besides simply collecting data, EISToolKit can distribute data into a Wingz spreadsheet for complex analysis and then present the results in simplified form in the user environment. To access the information, executive users navigate via button clicks and other basic operations.

EISToolKit can easily create links to data in Excel and Lotus 1-2-3 spreadsheets

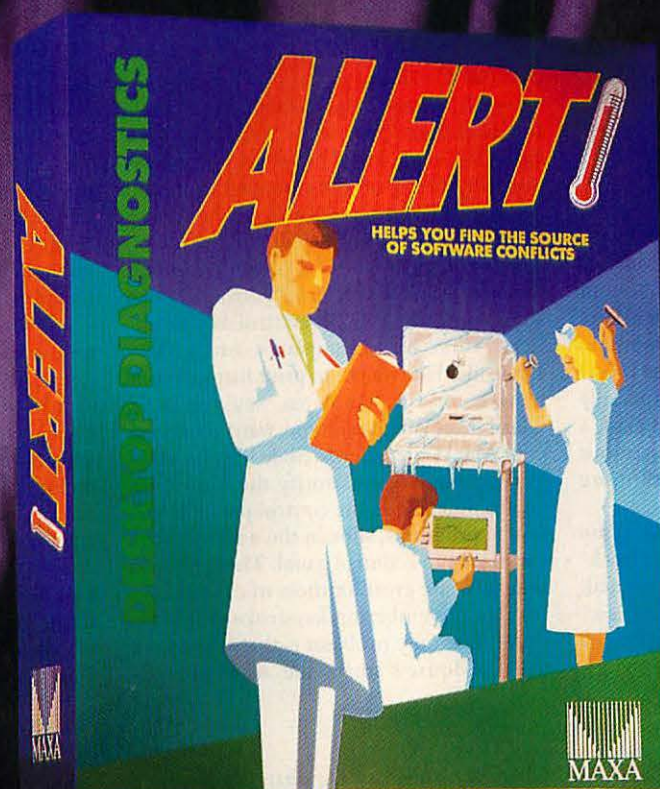


Picks That Click This simple but effective demo app was formulated from a straightforward set of calls to EISToolKit's graphing and data-access tools.

as long as those files are saved in early formats (it can't link to Excel 4.0, for example). Through its set of SQL tools, EISToolKit can collect data from Oracle, Informix, Clear Base, Sybase, DB2, and nearly all other SQL databases, using prepared SQL queries; but for the most accurate queries you need to do some HyperScript programming. EISToolKit also implements a proprietary routine called Drill-Down, in which the results of a SQL query are used to generate choices to guide users through successive, more-specific queries. Finally, the product is platform-neutral—if you create your system on a Mac, you have a Windows version as well.

EISToolKit provides good documentation, and the company offers on-site support and training. For many medium-size businesses, the \$7995 ten-pack and MicroStrategy's Quick Strike support option (in which a trained designer comes to your site for a week) is an attractive deal. One cloud on MicroStrategy's horizon is that Microsoft is already shipping a comparable EIS product for Windows and is promising the Mac version in spring 1993, but it remains to be seen whether that product's Visual Basic internals can outperform HyperScript. If you don't mind working from Wingz, MicroStrategy at least guarantees you a reliable, field-tested EIS development system.—CHARLES SEITER

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Input Device

The UnMouse

PROS: Cursor control, keypad, and graphics tablet in one; ergonomically superior to mouse; 60 programmable macros per template.

CONS: Only 16 macro buttons per template; ergonomically inferior to trackball.

COMPANY: MicroTouch Systems (508/694-9900). **REQUIRES:** Any Mac with an ADB port; System 6.0. **LIST PRICE:** \$199.



THE UNMOUSE IS A CURSOR-CONTROL device, programmable keypad, and small graphics tablet in one. You move your finger or a stylus across a touch-sensitive tablet, pressing down when you want to click. Who might need an UnMouse most? Users who don't like mice; users—especially PowerBook users—who need a keypad, a graphics tablet, or both; users without extended keyboards; and users with more macros than they can remember.

The UnMouse uses about the same space as a trackball, and far less than a trackball, keypad, and graphics tablet combined. Plus, it fits into a PowerBook carrying case, making it handy for people needing both a graphics tablet and a keypad on the road.

Using the UnMouse is simple; whether it's more intuitive than a mouse (as the company claims) is a personal call—I didn't find it so. In Absolute mode, every position on the UnMouse screen corresponds to the same spot on the Mac screen; touch the upper-left corner to access the Apple menu, and the lower-right corner to access the Trash Can. Mouse and Trackball modes give the UnMouse the feel of those devices.

The UnMouse can be particularly useful with PowerBooks, which don't have function keys, and with Macs that lack extended keyboards. All of the functions normally found on the extended keyboard are mapped on a template that slides under the UnMouse screen. To cut, just press Cut. MicroTouch supplies 60-macro templates for Word and Excel (16 "buttons," with shift-, option-, ⌘-, and control-key modifiers), three blank templates, and a MacDraw file that you use to print maps to your macros for the templates. Say you're in Claris MacWrite and you want to access your MacWrite macros. Slide in your MacWrite template and notify the UnMouse you're doing so in the control panel. If you switch programs, slide in the new template and revisit the control panel. These custom templates are great for those of us who have trouble remembering keystroke combinations. The only problem is that because of the UnMouse's small size, using the 60-



MicroTouch Systems' UnMouse

macro templates requires that you lean over to squint at the tiny print. With sets of more than 16 macros, you have to memorize movements just as you would keystroke combinations.

I wanted to try the UnMouse because mouse use led to repetitive-strain injury in my right shoulder and neck. Replacing my mouse with a trackball helped, but not enough. So now I use keyboard macros whenever possible to reduce mouse movements. MicroTouch makes no claims for the UnMouse's ergonomic design, but I'm still disappointed to find that this device also causes strain. For me, the trackball is a mouse-injured user's best option, but by taxing the shoulder less than the standard mouse, the UnMouse comes in second.

—ANN GARRISON

PostScript Laser Printer

DECLaser 1152

PROS: Contains PostScript Level 2; simultaneous support of Macs and PCs; excellent print quality; HP LaserJet emulation; inexpensive.

CONS: Small set of internal fonts; occasionally fails to print complex images; DECimage difficult to access; doesn't include software or drivers.

COMPANY: Digital Equipment Corporation (508/493-5111). **LIST PRICE:** \$1299.



POSTSCRIPT LASER PRINTERS MAY previously have been out of your price range, but the situation has just changed. The DECLaser 1152 is an inexpensive, 4-pages-per-minute laser printer with built-in PostScript Level 2. (Emulations of PostScript Level 1 and Hewlett-Packard LaserJet PCL4 are also provided.) Like most low-end PostScript printers, the 1152 prints at 300 dpi.

To keep the price down, DEC has provided the printer's ROM with only 17 font outlines, covering the Helvetica, Times, Courier, and Symbol font families. You can add other PostScript fonts, including Avant Garde, Bookman, Lubalin Graph, Souvenir, New Century Schoolbook, Palatino, Zapf

Chancery, and Zapf Dingbats, by buying a special font cartridge (\$249) that fits into slots in the side of the printer; or you can let your Mac's system software download PostScript or TrueType font outline files to the printer as needed.

The manual-feed tray handles up to 70 sheets of 20-pound paper or 5 envelopes. If you need larger quantities, you can buy an optional 200-sheet paper tray (\$174).

One feature that makes the 1152 a standout is its ability to handle print jobs from multiple sources. The printer's back panel has four connectors: LocalTalk, parallel, and a pair of serial ports. Using the first two ports, for example, you can simultaneously connect a Macintosh and a PC. It isn't necessary to flip a switch or disconnect cables when you want to change from one computer to the other. The printer automatically senses where each print job is coming from and queues them for printing.

The standard 1152 has 2MB of RAM. Although this is sufficient for normal print jobs, you may find that some highly complex images—such as those occasionally created in DTP programs—will not print. For another \$159, the printer's memory can be upgraded to 4MB.

As do the other DEC PostScript printers, the DECLaser 1152 includes a built-in image-enhancement routine called DECimage. DECimage, however, is difficult to

invoke and very slow. To turn it on, you must download a PostScript program to the printer, using a downloading program that DEC does not provide, such as LaserWriter Utility from Apple. However, the PostScript code that is generated when printing from many popular Mac programs frequently contains a PostScript keyword that conflicts with DECimage—effectively turning it off. Because DECimage requires extensive calculations and the printer is not equipped with a floating-point processor, you may grow impatient waiting for the output. It took two and a half hours to print an enhanced half-page graphic, for instance. Because of these limitations, I suspect that many will either ignore DECimage or use it only occasionally.

The DECLaser 1152 does not include software or a print driver. However, most major options (communications parameters, paper-tray selection, printer test, spilled-toner collection, and so on) can be set from the printer's LCD menu—accessed by pressing buttons on the front panel.

Print quality is excellent. The blacks are considerably richer than those from a IINT, for example. The only significant print problem I experienced was that envelopes tend to wrinkle badly. Otherwise, the 1152 provides an excellent combination of features at a ground-breaking price.

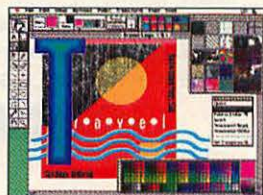
—STEVEN A. SCHWARTZ

You too can paint and draw...

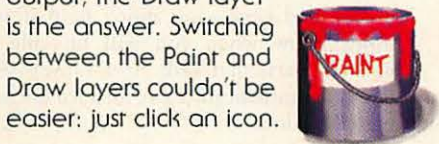


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Personal Scheduler and Organizer

TimeVision 1.0

PROS: Context-sensitive help; list view can show noncontiguous days. **CONS:** No undated to-do's; fixed-size windows; limited advance warning for alarms. **COMPANY:** Powercore (815/468-3737). **REQUIRES:** Mac Plus; hard drive; System 6.0.5. **LIST PRICE:** \$99.



BILLED BY THE COMPANY AS A PERSONAL information manager, Powercore's TimeVision is a scheduler with notepad and card-file functions tacked on. But with competitors like After Hours Software's DateBook and Now Software's Now Up-to-Date to contend with, Powercore will find the going rough.

Like most time managers, TimeVision lets you post events to a calendar file. But except for the way they appear in TimeVision's views, the three main event types (appointments, follow-ups, and to-do's) behave identically. To-do's must be given a date and time—not much help if you don't know when you will be able to get to a particular task. And TimeVision doesn't automatically carry forward uncompleted to-do's.

TimeVision has two other events—specials and holidays—that it reserves for special occasions. But these don't display automatically when you open a calendar; you must use menu commands to load them each time. And since holidays and specials are stored with the TimeVision application instead of the calendar file, you have to make a copy of the program to back them up.

You can schedule new events by dragging the cursor along a time line in the day view or by typing event times directly into the floating PowerEdit window. The interface is intuitive, but the pop-up menu for choosing times covers the entire day in half-hour increments, making the menu way too long. You can also enter repeating events directly from the PowerEdit window, but TimeVision books them forever into the future, not terribly useful for mere mortals. To schedule a limited number of occurrences, you must use the Replicate Event menu command, which is decidedly less convenient.

You can define up to 64 event categories, but each is limited to only four characters. And though you can merge individual TimeVision calendars, you can't import events from other schedulers. The reminder function is also limited: you can set alarms only up to 101 hours before an event; if you need a reminder a week in advance, you're

out of luck. (A separate DA lets you set alarms for any date and time, but again, it's inconvenient.)

TimeVision's event-viewing options are uneven. For starters, all the windows are fixed-size, a serious limitation if you're working with a 21-inch monitor. This restriction is especially noticeable in the miniature calendars that appear in TimeVision's day, month, and list views. Since there's not enough space to show event text, graphic symbols denote holidays, specials, and to-do's, resulting in a crowded display.

The Note Card feature provides the functionality of a paper index-card file. Each card can contain 32K of text, prefaced by an index of up to 35 characters that TimeVision uses for sorting. The Memo pad is simpler still—it lets you create, read, or edit unformatted text files up to 32K long. Most users will probably opt for a separate utility to store names, addresses, and phone numbers.

TimeVision does have a few worthwhile features. The context-sensitive help is very good, and the ability to display noncontiguous days in the list view is handy. And Powercore is genuinely interested in delivering a good product—in fact, the Read Me file lists several of the limitations noted here. Barring a major revision, though, I'm afraid that I can't recommend TimeVision.—FRANKLIN N. TESSLER

Biology Test Review on CD ROM

Comprehensive Review in Biology

PROS: Four complete reviews; less expensive than buying the components separately. **CONS:** Plain monochrome text throughout. **COMPANY:** Queue (203/335-0908). **REQUIRES:** Mac Plus; CD ROM player; hard drive; System 6.0. **LIST PRICE:** \$295.



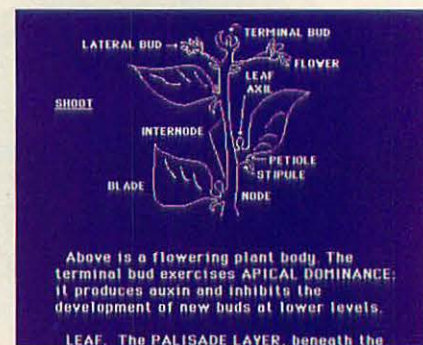
WHEN TELEVISIONS BECAME widely available in the late 1940s, educators were positively ecstatic about the medium's instructional possibilities. Predictions about the uses of a new technology are always somewhat tricky (the unchallenged triumph of lowest-common-denominator network programming was the one scenario not envisioned by early media pundits), but here's a prediction that should be safe: if companies don't start making better educational CD ROMs than Comprehensive Review in Biology, the Year of the CD ROM will always be next year.

CRB does have valuable contents. It covers the material generally assigned as Biology I and II, and provides three sample

tests for the Educational Testing Service's Advanced Placement Test in biology, practice for the CBAT biology test (six samples), and a large folder of material called Comprehensive Review. The modules are available separately, but the combined-product CD is several hundred dollars cheaper.

The test reviews are perfectly respectable—there just isn't any obvious reason why they couldn't have been a \$14.95 large-format paperback instead of a \$300 CD. The material in Biology I and II presents this same problem in more extreme form. There isn't a textbook publisher in North America with the nerve to publish a black-and-white biology book with nothing more than text and basic line drawings, much less charge several hundred dollars for it, but that, in effect, is what Queue is doing. This is not to say that Queue is doing something reprehensible by current industry standards—this effort is comparable to many other educational CD ROMs. This CD, in fact, may be a good investment for a large high school, since teachers could download and print for individual lessons and tests.

But knowing what can be accomplished on a Mac in 1993, it's just bafflingly meager. Hypertext referencing on the highlighted keywords, for example, would be extremely helpful, but there is none. And please remember, this is *biology*—how about a few 8-bit-color pictures illustrating plant



Just the Facts, Ma'am CRB lives up to its name—the coverage of topics is thorough. But don't expect anything except plain-text drills and low-resolution line drawings.

structures or anatomy? The material is so plain that all the tests take up only 6.5MB, leaving more than 200MB blank. With compression, the whole package could have been shipped on four floppy disks.

Queue and other publishers should, I think, accept this challenge: make educational CD ROMs that are better than books in some aspect other than simple durability. Right now, few products meet this challenge. Comprehensive Review in Biology might make sense for some institutional uses, but as the product stands now it would make more sense as a \$39 set of floppies than as a \$299 CD.—CHARLES SEITER

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Symbolic Mathematics Software

Theorist 1.5

PROS: Useful new tables feature; bigger special-function set for physics; better graphics; still the only program to use real notation directly.

CONS: Not easy to program large problems.

COMPANY: Prescience Corporation (415/543-2252). **REQUIRES:** Mac Plus; hard drive; System 6.0.2. **LIST PRICE:** \$449.95.



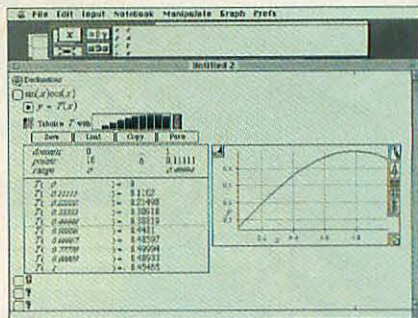
THEORIST HAS LONG BEEN DISTINGUISHED for sheer audacity on several counts. First, it offers an interface in which mathematical notation appears on the screen directly (Prescience also makes the math typesetting package Expressionist), so a page of calculus looks like calculus and not a patch of C-language programming. Second, Theorist is marketed as a David-like alternative to the Goliath Mathematica, a 6MB computational juggernaut used by hundreds of universities. Finally, the program assumes that users want to tackle their own problems directly; it lacks add-ons for electrical engineering, for example.

Version 1.5 is Prescience's response to two years of detailed feedback from users. It's interesting that, while Theorist origi-

nally offered a simple path to symbolic computation, users are clearly pushing it in a more numerical direction. The new version includes an expanded set of special functions: Airy, $J_n(x)$, $Y_n(x)$, $I_n(x)$, and $K_n(x)$. Theorist 1.5 also features a Fast Fourier transform routine of amazing speed; on data sets of 1024 points, a complex FFT on a Mac IIci takes less time than a screen redraw.

The principal innovation is the table function. A Theorist table can be defined in terms of other known functions, or purely numerically, or as a piecewise or even pointwise combination of the two. A table defined this way can be given a function name, and this function can then be used by name in symbolic manipulations. If you perform an integration, for example, you generate a new table function, which can also be manipulated symbolically. Combined with the new FFT capability, Theorist is now a much better product for working with imported instrumental data.

Version 1.5 of Theorist includes some necessary changes—Theorist's special font has been dropped, equation printing is greatly improved, and System 7 (including animation saved as QuickTime files) has at last been accommodated. Other changes are true improvements to the program: there's a greater variety of 2-D and 3-D plots, including parametric 3-D plots of space curves, and the balloon help



Totally Functional The new table function lets you define functions numerically and then use them in symbolic computations. Tables include graphical snapshots and a collapse-expand icon for viewing and concealing table text definition.

can sufficiently substitute for the manual.

You can take a copy of Theorist, and as a beginner, have something substantial to show for your efforts on the first afternoon—and on low-end hardware besides. There is no subindustry of training programs and seminars for Theorist as there is for Mathematica and Maple—Theorist is a program you can figure out by yourself, and the customer support is exceptionally good. I wouldn't count on Theorist for preparing a theoretical-physics Ph.D. thesis, but I'd pick it for a four- or five-page engineering problem or bit of quick experimental data analysis any day.—CHARLES SEITER

Backup Utility

DiskFit Direct 1.0

PROS: Uncomplicated backup and restore functions; updates only changed files; deleted files are automatically removed from backup disks.

CONS: Doesn't back up to hard drives or tape drives; some unintuitive commands; can't perform unattended, scheduled backups. **COMPANY:**

Dantz Development Corporation (510/849-0293).

REQUIRES: Mac Plus; 2MB of RAM;

System 6. **LIST PRICE:** \$49.95.



DANTZ DEVELOPMENT'S NEWEST utility, DiskFit Direct, is an efficient backup system that's simple and painless enough to improve anyone's backup habits.

DiskFit's interface is refreshingly uncomplicated. The main window contains three buttons—two to initiate the basic backup and restore functions, and one to access the well-written help files. The program supports 800K or 1.44MB floppies, as well as SyQuest or Bernoulli cartridges and optical drives. DiskFit Direct can't be used to back up to a tape drive or a hard drive.

DiskFit Direct saves your data to a set of disks called a SmartSet. You begin by assigning a name to the SmartSet and indi-

cating the data you want to back up—an entire drive, documents only, or the contents of specific folders. DiskFit Direct then asks for as many floppy disks as it needs. (You'll need eight 1.44MB floppies for every 10MB you want to back up.)

DiskFit Direct automatically erases any existing data from each disk introduced into the set, assigns each disk a number for future reference, and then copies files to it.

If a single file is too large to fit on a single floppy, DiskFit Direct automatically splits the file and stores the pieces as separate numbered files (1. Large Graphic, 2. Large Graphic, 3. Large Graphic, and so on). When you copy the split file back to the hard drive, you reassemble it using the Join Files command.

Once you've created a set of backup disks, the subsequent incremental backups are relatively easy. During updates, DiskFit scans your drive and backs up only the changed files. The program prompts for the necessary disks in the SmartSet.

DiskFit also determines which files have been deleted from your drive since the last backup, prompts for the SmartSet disk containing those files, and erases them from the backup. While this saves disk space, it can also be dangerous. If you back up your drive and then discover that you've inadvertently deleted an important file, you'll no longer have it stored on the SmartSet

either. For this reason, Dantz recommends creating at least three full SmartSet backups and alternating between them in your backup strategy.

DiskFit's commands and prompts are mostly straightforward, with a few odd exceptions. Most notably, after you've restored files from your backup disks, you have to click on the Missing button, even though none of the backup disks are missing—a completely counterintuitive step.

For each new set of backup disks you create, DiskFit Direct prepares a complete report, showing the date and time of the previous backup, the names of the backed-up drive and of the SmartSet containing the backup, the number of disks used, and how much disk space was required for all the files. Each file is assigned a number corresponding to the SmartSet disk containing that file, so you can quickly locate a particular file in the set of disks. The report also shows whether or not the backup was successful and reports any errors.

DiskFit Direct lacks some of the advanced backup features, such as the ability to compress and archive seldom-used files and perform unattended, scheduled backups. It is admittedly a bare-bones utility, but that's the whole point—it's inexpensive, it takes almost no time to master, and it's trouble-free enough to encourage frequent use.—JOSEPH SCHORR

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Time-Management Software

DayMaker 2.0

PROS: Flexible printing options; supports recurring calendar items; easy to customize; improved performance. **CONS:** No network support. **COMPANY:** Pastel Development Corporation (212/941-7500). **REQUIRES:** Mac Plus; hard drive; System 6.0.5. Recommended: 2MB of RAM. **LIST PRICE:** \$129.95.



WHEN IT FIRST CAME OUT, DAYMAKER was my choice for a personal information manager. It was free-form enough to handle disparate types of information, but structured enough to provide quick access to whatever I needed to find. DayMaker 2.0 is even better. It addresses the earlier version's key weaknesses by providing better tracking for to-do items, much-improved printing capabilities, support for recurring calendar items, and faster performance.

DayMaker's structure remains unchanged. The basic unit of information is an item. Items associated with dates are calendar items; those that aren't are note items. You can assign any item up to four labels, which you can use to create related groups of items. You can display calendar items in

a day, week, or month view, and all types of items can be displayed in the list view. And version 2.0 adds a to-do view.

The to-do view makes DayMaker even better at what it always did well, keeping a running, prioritized list of the tasks you need to accomplish. To-do items display in a split window, with all pending to-do's at the top and a list of all completed tasks at the bottom. To create a new to-do, a procedure that formerly required several steps, you click once in the undone-items section.

The inclusion of Portfolio Software's DynoPage Lite technology makes DayMaker 2.0 a great tool for organizing information and taking it on the road. Six pre-configured layouts let you print on double-sided pages that fit into a 3¼-inch-by-6¼-inch six-ring binder, multiple-page booklets, half-page binders complete with headers and footers, storyboards, or trifold brochures. With version 2.0 you can now print single items too.

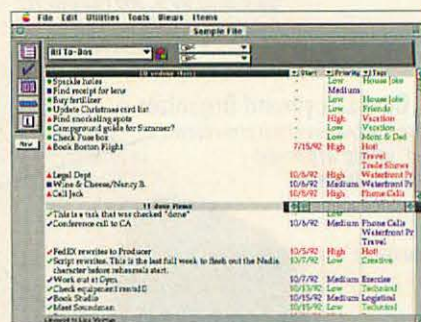
Also new to DayMaker 2.0 is the ability to schedule recurring items. Plus, you can select the intervals by day or month, making it easy to track paychecks that recur every other Thursday, for example, or rent that is due on the 4th of every month. An upcoming upgrade will let you schedule meetings and events over a network.

Finally, DayMaker 1.0 was annoyingly slow to open because the entire data file

loaded into RAM (although performance was quite fast once the file was loaded). DayMaker 2.0 is disk-based, so files open much more quickly.

My former job required keeping track of a lot of phone calls, and for that I liked using After Hours Software's TouchBase and DateBook in combination. But my current job focuses more on internal management—organizing disparate information, following up on meetings with many people, maintaining my own calendar, creating an archive of completed work, and printing lists of to-do items to take on the road. For all of that, DayMaker 2.0 is a great choice.

—LIZA WEIMAN



To-Do View To mark a to-do item as completed, click once to select the item, then drag it to the lower window; dragging it to the upper window changes it back to an undone item.

Writing Tool

RightWriter
for the Mac 5.0

PROS: Analyzes different writing styles; good for students. **CONS:** No custom language rules. **COMPANY:** Que Software (317/573-2500). **REQUIRES:** Mac Plus; hard drive. **LIST PRICE:** \$99.95.



MY TENTH-GRADE ENGLISH TEACHER was always looking over my shoulder critiquing my work. Her ruthless, persistent criticism taught me a lot, and it's given me an appreciation for that relentless drive to improve writing. RightWriter 5.0 is an electronic version of Mrs. Quatermass.

It's shortchanging RightWriter to call it a grammar checker. While it traps common grammar problems, the product also deals with writing style, word usage, punctuation, and capitalization issues. Even better, it offers writing-style filters for your prose. Passive-voice sentences can get you the death penalty in the technical-documentation world, but they are standard in the world of funding, where a proposal

written in active voice may fail because it looks "simplistic."

RightWriter's style filters include Fiction, Newsletter, Proposal, Scholar, and Technical Manual, among others. If you know your grammar and need more-precise control, you can tweak every one of RightWriter's many switches to customize a writing style for your specific needs. The manual includes a matrix of the settings for each style, so you can understand both the differences in writing styles and how to adjust the settings for your own goals.

RightWriter also gives summary statistics such as Flesch and Fog readability indexes. For the uninitiated, these are rigid numeric measures of the grade level you are writing to, based on how long your words and sentences are.

I like the different ways you can go through the analysis procedure. You can interact with RightWriter as it checks your file, flags potential shortcomings, and advises you on improvements. This feature, new to the program, lets you make changes as you go. You can also have the program create a marked-up copy in your word processor's file format, allowing you to look at all the suggestions and deal with them as a whole. Finally, you can get just the Summary, a statistical overview with some overall critique, most useful in situations where you use the product as a teaching aid.

Version 5.0 overcomes a limitation in previous versions—it checks text you've changed to make sure it doesn't have flaws. Que has also added an industrial-strength online help system and Clipboard support for importing text from nonsupported applications such as databases and spreadsheets.

RightWriter is fully compatible with a range of files: ASCII, MacWrite (4.5 and 5.0), MacWrite II (1.0 and 1.1), Microsoft Word (3.0 and higher), Microsoft Works, WordPerfect, and WriteNow.

The manual is adequate. It includes a 26-page overview of common grammar mistakes and how to avoid them.

RightWriter's chief competition is Reference Software's Grammatik for the Mac. Grammatik is far more customizable; you can create your own corporate or personal rules. With RightWriter, on the other hand, it's easier to tinker with the program's internal rules, and I think RightWriter does a slightly better job of differentiating styles. I prefer Grammatik for my own use or as a corporate standard (because of the custom rule-checking), but RightWriter is probably the stronger entry for students.

RightWriter is a serious tool for people looking to improve their writing, and it sure beats the heck out of having Mrs. Quatermass looking over your shoulder.

—JEFFREY GORDON ANGUS

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Tree-Drawing Software

Tree

PROS: Visually appealing and entertaining; responsive performance; extensive controls.

CONS: Nonstandard File menu; limited color support; exports only PICT format; expensive.

COMPANY: Onyx Computing (617/876-3876).

REQUIRES: Mac II; 2MB of RAM; 8-bit, 13-inch color monitor; System 6.0.5; 32-bit QuickDraw. Recommended: Math coprocessor.

LIST PRICE: \$295.



ARCHITECTS, LANDSCAPE DESIGNERS, environmental planners, and anyone who needs to produce visual-impact studies should consider purchasing Onyx Computing's Tree. Tree is an elegant, single-purpose program that generates lifelike color drawings of trees from a number of easily controlled parameters. Instead of simply replicating a selected clip art image, with Tree you tell the program the kind of tree you want to "grow."

Tree does not look or behave like other Mac applications, but once you get the hang of the interface, it's easy to be creative and free-flowing. To create a tree, you pick one of ten sample trees to use as a template

(either from the File menu or by choosing the Load Parameters command) or you set your own parameters from scratch. The main window features a drawing area and a parameter-controls area, each with an identical set of five buttons. Three determine whether you're working on the bough, branch, or twig level. This trio in the drawing area (on the left) produces a linear representation of your tree; the same trio in the parameters area (on the right) enables you to set numerical controls for 45 traits, such as twig length, bough angle, and branch curve factor. The other two buttons in the drawing area toggle the program's "rendering" mode on and off. When these are inactive, you get a simple linear drawing, with or without foliage; active gets you a simple shaded bitmapped image. The correlating buttons on the parameter side let you numerically define the program's limited shading and colors. Finally, there's one central button that initiates the draw command (you have no drawing tools per se).

You cannot color or assign patterns to the trunks or branches. Bark is depicted as modifiable gradations of gray. Foliage is limited to three colors—green, red, and blue—but you can modify the mix and contrast. Also, leaves do not have individual shapes but are instead generalized clusters of pixels, whether you intend pine needles, palm fronds, or magnolia leaves. And



Weeping Willow After visualizing the tree in two dimensions and setting parameters, I added three-dimensionality and leaves to grow this modified weeping willow from one of Tree's sample files.

although you can interrupt the drawing cycle to modify settings or switch drawing modes, you cannot halt the growth process at an immature state, for example, to show young trees planted near new buildings.

You can either save your trees as parameter settings or save the images in PICT format. Note that unless you export your tree to an image-editing program that supports antialiasing, your tree will print at 72 dpi and suffer serious jaggies.

Tree is a fascinating and entertaining limited-purpose program. And though the trees you draw with it are not scientifically accurate, they do provide a naturalistic touch to visual-impact studies.—RITA LEWIS

Dynamic-Systems Modeling

ithink 2.2.1

PROS: Forces user to understand business models; simplified iconic model-programming language; good support graphics. **CONS:** Requires real training commitment for effective use.

COMPANY: High Performance Systems (603/643-9636). **REQUIRES:** Mac SE; hard drive; System 6.0.4; 2MB of RAM. **LIST PRICE:** \$695.



THREE HUNDRED YEARS AGO, 98 PERCENT of humankind could use the job description "farmer." The business model appropriate to this situation was, at least, straightforward: if the right amount of rain appeared, everything was fine, and if not, everything was a disaster. Besides, 10,000 years' accumulation of folk wisdom about farming made modeling unnecessary. Our fabulous and yet not-always-satisfactory postindustrial society, by contrast, calls for business models that we expect to be complex, and we therefore concoct remarkably complicated spreadsheet models for business operations.

These models present two problems. First, they tend to be snapshots of a business's finances at a single time rather than

a true dynamic model. Second, the relationships, in formulas, that define the model are typically hidden, and only results are displayed. A subtler drawback of spreadsheet models is that users rarely accept counterintuitive conclusions. Faced with a model that shows a company being steered off a cliff, the usual response of the modeler is to rewrite the assumptions (often originally correct) built into the spreadsheet.

The best remedy for this is dynamic modeling, and ithink is currently the most attractive dynamic-modeling system for the Mac. With hundreds of pages of training material and many examples, it introduces the user to a world in which adding more people to the shipping department slows down shipments, processing more sales leads brings sales to a halt, and reducing internal inventory boosts output. The point is, these situations often occur in business practice but are never predicted except by dynamic models, which take into account explicitly the impact that timing, delays, and interrelationships have on results.

ithink provides a small set of icons for quantities, flows, changes in flows, and feedback relationships between quantities. These icons make an on-screen model of the business process, so that in contrast to spreadsheet practice, in which formulas are usually hidden, in ithink the formulas are directly represented pictorially. As you draw

connections, you double-click on each type of icon to fill in numerical details (initial value, range of possible values), and indicate whether you want to associate a graph with the icon. This simple scheme is naturally quite easy to master. What's more difficult is becoming competent at modeling technique—that's why you really must work through most of HPS's examples and tutorials to make the program valuable. Once you do, you realize that making a model in ithink corresponds exactly to understanding the quantitative relationships in a business. Once you get the hang of it, ithink is impressive. Quantities can be associated with realistic distributions rather than single values, and, ithink computes a distribution of results; complex models can be built up from simple models defined in linked sectors, so you're not put through the error-prone process of making a single huge diagram for a complex process.

If you're ordering ten new copies of Excel for the ten new employees, order nine instead and get ithink for the employee with the most math background. After that, if a spreadsheet projection contradicts the results of an ithink model, you have found an area that deserves more investigation. It calls for more intellectual effort than standard spreadsheet work does, but ithink is your best bet for identifying cloudy spots in the crystal ball.—CHARLES SEITER

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Training Software

CPM Graphic Tutor 1 & 2

PROS: Addresses a need of novice users.**CONS:** Unpolished; difficult to navigate; illogically organized in parts. **COMPANY:** Caseys' Page Mill (303/220-1463). **REQUIRES:** Mac II; hard drive; CD ROM drive; System 6.0.4. **LIST PRICE:** \$489 per volume.

ADobe Illustrator and Adobe Photoshop, workhorses of Macintosh graphic production, are powerful, complex programs that can be intimidating. Although tutorial guides accompany both programs, many people—particularly newcomers to the Mac—find they need extra help. Caseys' Page Mill aims to provide this help through a pair of CD ROM discs, the CPM Graphic Tutors.

What holds true about classroom instruction also applies here: to convey your material, you've got to keep your students' attention; and to do that, the style of instruction can be as important as the content. While the information contained in the CPM Graphic Tutors may be valuable to the novice, the programs' distracting interfaces and inconsistent execution weigh

strongly against them. For \$489 a pop, you've got a right to expect a highly professional product.

Each disc consists of lessons with voice-over instruction that you access via hierarchically arranged buttons. The lessons cover most of the basics of the programs; advanced users will not find much of interest. Illustrator topics include scanning templates for autotracing, drawing with the freehand and pen tools, and selecting and painting objects; Adobe's Streamline and Separator programs are also discussed. The Photoshop volume covers feathering selections, exporting to Aldus PageMaker, file formats, and color theory, among other topics.

The lessons move slowly, which can be good or bad, depending on the needs of the user, but they're also sometimes disorganized. For example, the discussion of bit depth appears, illogically, in the section on Photoshop PICT files. Some of the lessons also contain factual errors. For instance, the Photoshop tutor advises you to use ASCII encoding and to avoid the 5-file DCS format when saving Photoshop EPS files for placement in Adobe Illustrator. In fact, Illustrator 3.2 (the version shown in the tutorial) accepts binary (a much smaller file than ASCII) as well as DCS.

The visual component of the lessons consists of animations recorded using Farallon's MediaTracks, a program that was

never intended for creating commercial training presentations. MediaTracks often delivers sloppy results—pull-down menus that don't fully draw, screens that redraw in pieces, and so on.

You enter the tutorials by launching the MediaTracks player (copied from the CD ROM to the hard drive) and navigating through an Open dialog box to the master MediaTracks file. A more polished approach would have been to have the tutorial launch with just one double-click. Also, the MediaTracks control panel retards navigation. Aborting a lesson causes the MediaTracks player to quit; to continue with the tutorial, you need to relaunch the player and plod through the Open dialog box again. Skipping or replaying parts of lessons is equally annoying: sometimes the fast-forward and fast-reverse buttons work, sometimes they don't.

For comparison, I looked at the videotape demo that shipped with Adobe Illustrator 88. It's polished and professional. Twenty minutes covers Illustrator essentials in a clear, engaging manner—the way tutorials should be done.

I hesitate to dismiss the CPM tutorials entirely; some Macintosh neophytes may find them helpful. You have the opportunity to judge for yourself by ordering the \$10 sampler CD ROM disc from Caseys' Page Mill.—BILL JUSTIN

Interior-Design Software

Expert Home Design

PROS: Multiple layers; 8-bit color; large furniture library; online help. **CONS:** Does not generate side views; does not provide %key access to library objects. **COMPANY:** Expert Software (305/567-9990). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.5. **LIST PRICE:** \$49.95.

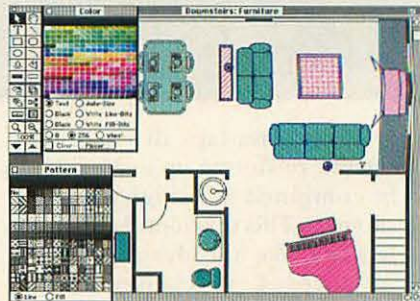
IF YOU NEED A HOME- OR OFFICE-interior layout that is precise but not as detailed as a blueprint, you can quickly and easily create it with Expert Home Design. Even if you've never used a graphics program before, you can readily produce an interior plan complete with furniture, accessories, and appliances, in your choice of colors and patterns. Geared toward the home and small-business user (rather than toward professionals such as architects and interior designers), Expert Home Design provides an array of 256 editable colors, multiple document layers, a large library of furniture objects, online help, good documentation, at a very reasonable price.

Expert Home Design opens to a floating tool palette and a graphics window

with layers, which act like the transparent acetate sheets architects use. Additional floating palettes accessible from the Window menu contain colors; patterns; an alignment feature; a help display; and libraries with more than 120 customizable furnishings for the bathroom, bedroom, living room, and so on. Unfortunately, you can't access objects from the Objects library with command keys, as you can in Design Your Own Home Interiors, a competing program from Abracadabra.

Expert Home Design is simple to use but flexible. You can draw the layout of a space using the wall and window tools, and copy furniture from the libraries to your interior. Using the line, arc, rectangle, oval, and polygon drawing tools, you can customize furniture from the libraries or create your own. You can also import PICT-format images from drawing programs or clip art collections, and export your room plans to other applications. The text tool lets you label areas or objects, or annotate your drawing. You can also easily copy objects from one drawing to another, replace objects with a drawing, grab particular attributes of objects (such as line width, color, and texture), and measure areas.

Available color modes are black-and-white, 16 grays, 16 colors, 256 editable



Colors and Patterns Galore Using Expert Home Design's Grab Attributes tool, you can apply colors and patterns to furniture, or copy them from one object and apply them to another—a boon for coordinating your plan. These objects come from the program's extensive library; you can also draw your own or import PICT images.

grays, and 256 editable colors. Expert Home Design lacks Design Your Own Home Interiors' capability to generate side views—not a serious shortcoming, in my opinion.

Expert Home Design offers the user an appealing combination of features, ease of use, well-integrated design, and performance for creating precise interior-design layouts at an unbeatable price. If you create interior layouts from time to time, buy Expert Home Design.

—REBECCA HUBA

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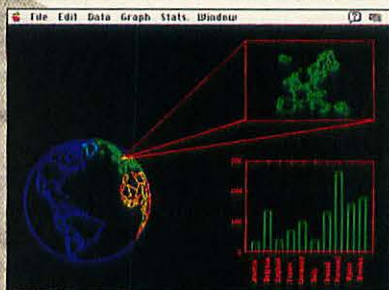
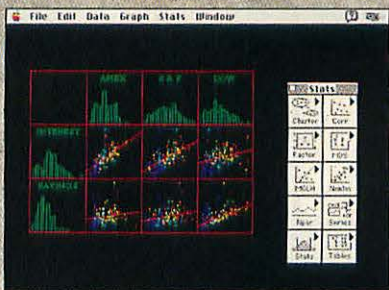
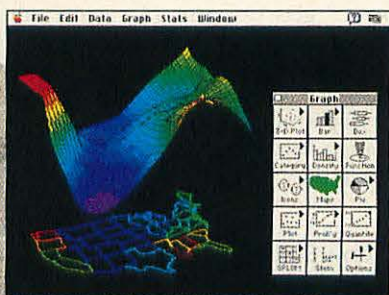
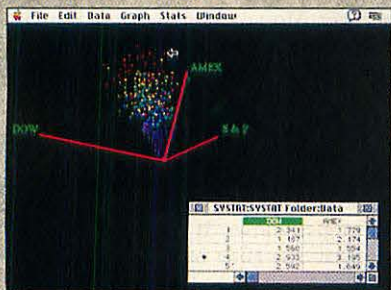
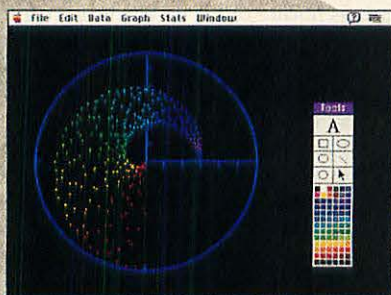
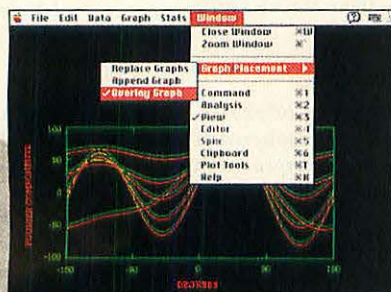
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Adventure Game

Monkey Island 2: LeChuck's Revenge

PROS: Two play modes; hugely funny and horrendously entertaining. **CONS:** Disappointing ending; copy protected. **COMPANY:** LucasArts Games (415/721-3394). **REQUIRES:** Mac II; 4MB of RAM; hard drive; SuperDrive; 256-color monitor; System 6.0.7. **LIST PRICE:** \$59.95.



MONKEY ISLAND 2: LECHUCK'S Revenge, the adventure-game equivalent of *Mad* magazine, is loaded with witheringly sarcastic dialogue, splendid gross-out jokes, self-parody, and enough hilarious detail to keep you amused for days.

The game has two play modes: Lite and Regular. You can graduate from Lite to Regular, but since both modes share the same story line, there are few surprises the second time around. The Regular mode compensates for its increased complexity by providing the lion's share of the jokes.

As in the first Monkey Island game, *The Secret of Monkey Island*, your character is a young blowhard who seeks high adventure and the acceptance of his pirate-

ing peers. Ghost pirate LeChuck, the scourge of the seven seas who was vanquished in Monkey Island 1, is reincarnated from a fragment of beard that you stupidly give away to the evil Largo. To permanently defeat LeChuck and Largo you must locate that most precious of pirate treasure troves, the fabled Big Whoop.

Other old friends from the last game include Stan, onetime used-ship salesman, now selling used coffins; the Men of Low Moral Fiber; and your one true sweetheart, Elaine Marley. Unfortunately, Elaine has quit her job as Governor of Mêlée Island and moved away without leaving a forwarding address, hoping to avoid seeing you again. (Apparently your free-agent relationships with other women led to an off-screen breakup.) Elaine hasn't forgotten you, though, even naming her dog after you. When you finally escape the mutt and enter the Marley mansion, the lady of the manor sums up her deep-seated feelings for you: "There's something about your weakness and ineptitude that I find infectious."

As hard as this kind of abuse is to take, it's even harder to dish out. At one point, you must steal a monocle from Wally, the game's nicest guy, and harden your heart as he searches for it in vain. "I can't see without my monocle!" he exclaims, then, "I'm such a dope," and finally, "I bet my mom would help me find it... if she were alive."



The Sins of Real Grog Our pirate hero dons a beard and enters drinking contests. But there's a moral to the story: If he slurps down the real thing, he wakes up disoriented and defeated. "Drinking never solves anything," the hint book warns.

My wife felt so sorry for Wally that she made me give the monocle back. My wife would make a poor pirate.

Like other LucasArts products, *Monkey Island 2* is copy protected. But my real disappointment was the game's ending. Not only does the climax steal directly from *The Empire Strikes Back*—at least it's all in the family—it's an enormous letdown, and nowhere near as spectacular as the finale to *The Secret of Monkey Island*. As if to make amends, the game offers a few bits of wisdom after the credits wind down. "Turn off your computer and do something constructive," it suggests, "like talk to a member of the opposite sex." Words to live by. —DEKE MCCLELLAND

Screen Saver

Star Trek: The Screen Saver

PROS: Entertaining; high-quality animation. **CONS:** Repetitive sounds; no Final Exam grade. **COMPANY:** Berkeley Systems (510/540-5535). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.4. **LIST PRICE:** \$59.95.



CREDIT THE FOLKS AT BERKELEY SYSTEMS—they've taken a simple application and turned it into an industry. Like *After Dark* and *More After Dark*, *Star Trek: The Screen Saver* is a utility that prevents static images from burning into monitors by changing the display at user-specified intervals. *Star Trek's* control panel provides the functionality of *After Dark* and is fully compatible with earlier modules.

As any "Star Trek" fan will admit under the influence of a Vulcan mind meld, the TV episodes varied in quality, and so it goes with the screen saver. Communications, which pops up messages in "Trek"-inspired fonts, is the simplest module. The Mission, the most ambitious, opens with Kirk sitting on the bridge. Every so often the scene

shifts to Mr. Scott tinkering away deep in the *Enterprise*. But the real action takes place on the ship's main screen, which shows an endless parade of aliens, spacecraft, and artifacts from "Star Trek" episodes. My only complaint is that the accompanying sound clips often don't match the action, and listening to Kirk saying "Scotty, give me that power!" gets tiresome. (As in the other modules, you can turn the sound off.)

Several modules are centered around *Enterprise* view screens. Planetary Atlas is a travelogue of missions, complete with fascinating facts about each world. Another module shows the diagnostic displays in sick bay, along with notes about space age diseases and sarcastic comments from Dr. McCoy. Scotty's Files presents schematic



Spock In this module, Spock roams your screen, taking tricorder readings and engaging in other typical activities.

diagrams of phasers, communicators, and other paraphernalia, and Ship Panels displays *Enterprise* control panels, including a food replicator and the ship's chronometer.

Other modules are related to specific episodes. For example, Brain Cells conjures up the disgusting amoeba-like aliens encountered on one mission, and Tribbles brings hordes of the cuddly little creatures cascading onto your monitor. (A nasty Klingon appears every now and then, eliciting a noisy reaction from the furry crowd below.)

Star Trek's most unusual module isn't really a screen saver at all. Final Exam challenges you with—you guessed it—a "Star Trek" trivia quiz. Correct answers to the multiple-choice questions bring a fanfare or a verbal pat on the back from an *Enterprise* officer, while incorrect responses sound an ominous note from the Mac's speaker. Most questions are moderately difficult, even for longtime fans. Alas, you don't get an overall grade—the display disappears with nary a word of encouragement from Starfleet Academy.

The software is as solid as earlier offerings, although there have been the usual sporadic reports of hardware and software incompatibilities. If you want to go where no Mac has gone before, *Star Trek: The Screen Saver* is the logical choice.

—FRANKLIN N. TESSLER, WITH HELPFUL HINTS FROM MARY GROOMS



OR



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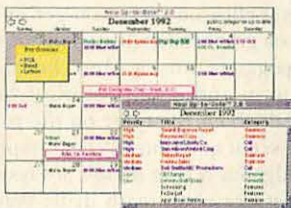
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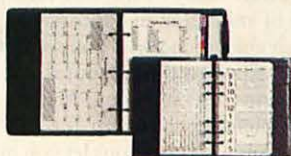
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Statistical Analysis

Data Desk 4.0

PROS: Brilliant interface; intelligent anticipation of choices; increased usability of advanced functions; compact and fast. **CONS:** No conventional time-series tools. **COMPANY:** Data Description (607/257-1000). **REQUIRES:** Mac Plus; hard drive; System 6.0.4. **LIST PRICE:** \$595.



THE BEST MAC PROGRAMS REFLECT the strong vision of an individual, and are seldom the product of committee design. Data Desk, one of the best Mac programs of any kind, reflects the opinions of developer Paul Velleman on the way the Mac can lend itself both to exploratory data analysis and to more traditional types of statistics. Version 4.0 is even faster than earlier versions and still can run on a humble 1MB Mac Plus or PowerBook 100.

Here's an interface example. When you open a data file, you see all the data elements represented as little icons, which correspond roughly to columns in a table. You can drag across a selection of these, pick Scatterplots from the Plot menu, and Data Desk 4 generates scatterplots from the

selected data. If you want a different y-variable plotted against a given x-variable, you simply drag the new variable's icon to the y-axis of the appropriate graph. There's no fussing with dialog boxes, no clicking back and forth between windows, and no delay (Data Desk is the fastest plotter around).

Here's another example. Since output from even a small linear model can take up pages of text, Data Desk 4.0 automatically generates an outline window for reporting the results of an analysis—you click on arrow icons to expand outline sections and click again to contract. And if you decide that a graph of one variable against another would be illuminating, you can drag the variables by name to any available plot window and generate the plot automatically. Essentially, you can perform tests on your data as fast as you can think of them. This is true, remarkably, for data sets of any size; in principle, analyses are limited only by hard drive space (the program has its own virtual memory system, better than Apple's), and data sets of more than 100,000 cases are no problem for Data Desk 4.0.

Increased program intelligence, in the sense that the program correctly anticipates choices for the user, is evident in several other areas. Data Description found that users often have trouble picking appropriate transformations of data to simplify analyses. Thus Data Desk 4.0 provides an

interactive transformation mode; in picking an exponent for a power-law transformation, the user moves a slider and watches a graph of the results of the transformation. In analysis of nested models, for which a brute-force approach can lead to lengthy numerical churning, Data Desk 4.0 performs an internal preliminary analysis to determine the most efficient computational path. It also has an automatic sampling function, meaning that very fast approximate analysis of huge data sets is possible.

The program also provides a novel data-smoothing method called *trewess smoothing* (in reference to the standard *lowess* smoothing) that essentially represents Data Desk's approach to time-series problems. Trewess smoothing is robust and in most cases a better forecasting tool than more popular techniques, but it's time that Data Description coded up ARIMA and a few other routine methods, if only for comparison with extrapolated trewess results.

You don't get a lot of help with chart prettification, and Data Desk leaves out (on purpose) many of the tests found in larger programs such as SYSTAT. But for getting to the heart of the matter, which is finding patterns in data, Data Desk 4.0 has no peer. Years of pedagogical and programming refinement have made it a unique, and uniquely valuable, tool for analysis.

—CHARLES SEITER

Math Tutorial

Algebra

PROS: Interactive, imaginative, yet keyed to standard textbook order of topics; thorough, includes solid self-testing; great use of hypertext and graphics. **CONS:** Can't size windows. **COMPANY:** Broderbund Software (415/382-4400). **REQUIRES:** Mac Plus; hard drive; System 6.0.4 (2MB of RAM and System 6.0.7 for color). **LIST PRICE:** \$89.95; school edition \$99.95.



ALGEBRA, LIKE ITS COMPANIONS Geometry, Physics, and Calculus, was written by a small company called Sensei, but is being sold by Broderbund, creator of Carmen Sandiego. Although Algebra is something of a poor relation in the Broderbund family (there was no sign of any Sensei software in the Broderbund display at Macworld Expo in January), it may be, for high school students at least, the most valuable program in the company's lineup.

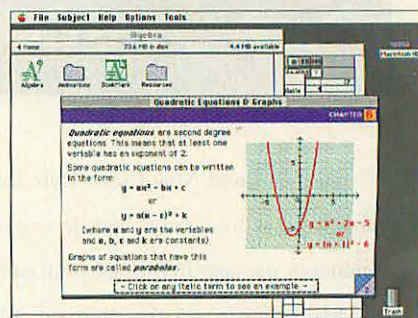
The program is organized like a standard textbook: starting with basic definitions and graphing and ending with polynomials and factoring. You navigate Algebra by clicking on the corner of individual pages. Continuing the book theme, the pro-

gram has an index for looking up topics quickly, and features an automated bookmark to save your place between sessions.

This program, however, is a great improvement over an algebra book. Most pages have several hypertext references—when you click on these you get in-depth textual or graphical explanations of terms. Many pages feature a More button that pops up an anecdote, historical or biographical, about the topic on the page, or another set of questions. What's impressive about Algebra is that there's always something besides plain math drills available. This is a refreshing contrast to the dozens of tutorial programs on disk or CD ROM in which the format follows, exactly, that of traditional drill books. In fact, it's amazing that this three-floppy set, rather than a CD ROM, offers many of the best examples of the use of animation in a tutorial.

Each chapter includes quizzes and questions interspersed throughout the material and a chapter test at the end (there's even a pop-up scientific calculator for you to use on questions). All questions let you proceed to a new topic with a correct answer, try a simpler question if your answer is wrong, or bounce back into the text for more explanations. Chapter tests are self-grading, and you get a clear picture of how you would do on a real test in school.

Algebra is strong in two areas that cause

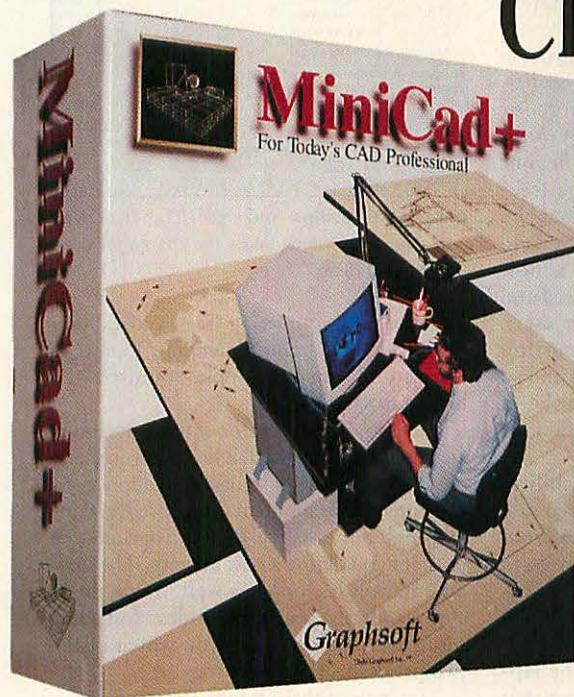


Clever Plot Expressions in italics are hypertext and can be expanded. A minor drawback is that windows can't be sized to fit your monitor.

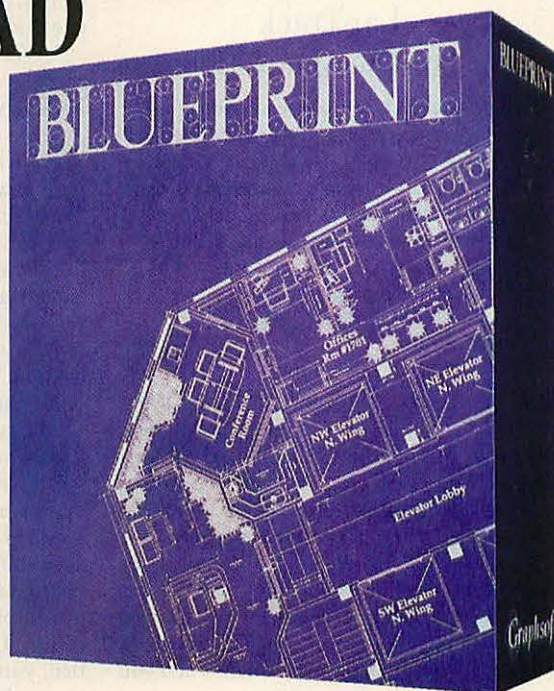
difficulties for many students: word problems and graphing. Given that most of the algebra you encounter outside of school amounts to translating a situation into an equation or interpreting a graph, it's an appropriate place for emphasis. Having reviewed most preparation programs for the Scholastic Aptitude Test, I can tell you that serious sessions with Algebra will do more for your SAT math score than those special-purpose programs.

If you're in high school, borrow a car to drive to the next prom instead of renting a limo, and sink the money you save into a copy of Algebra. Better yet, lobby your school to get the discounted school-lab pack.—MARY TOTH

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2D CAD:

- | | |
|--|---|
| <input type="checkbox"/> smart walls | <input type="checkbox"/> fillets |
| <input type="checkbox"/> Smart Cursor for locating snaps | <input type="checkbox"/> editable fills |
| <input type="checkbox"/> advanced auto-dimensioning | <input type="checkbox"/> beziers |
| <input type="checkbox"/> editable line styles | <input type="checkbox"/> wall-join |
| <input type="checkbox"/> pan by scroll bars or hand | <input type="checkbox"/> chamfers |
| <input type="checkbox"/> color by object or layer | <input type="checkbox"/> tolerancing |
| <input type="checkbox"/> DXF translator - free | <input type="checkbox"/> unlimited saved views |
| <input type="checkbox"/> unlimited layers | <input type="checkbox"/> hatching |
| <input type="checkbox"/> global symbol editing | <input type="checkbox"/> polylines |
| <input type="checkbox"/> on-line prompts | <input type="checkbox"/> classes |
| <input type="checkbox"/> unlimited drawing space | <input type="checkbox"/> export EPSF |
| <input type="checkbox"/> pick-up and put-down attributes | <input type="checkbox"/> free Claris CAD translator |
| <input type="checkbox"/> selection by properties | <input type="checkbox"/> round wall caps |
| <input type="checkbox"/> auto-insert symbols in walls | <input type="checkbox"/> edit inside groups |
| <input type="checkbox"/> hierarchical symbol library | <input type="checkbox"/> scale by layer |
| <input type="checkbox"/> add & subtract surfaces | |
| <input type="checkbox"/> fractional feet and inches option | |

3D CAD:

- | | |
|--|--|
| <input type="checkbox"/> mechanical projections | <input type="checkbox"/> 3D reshape tool |
| <input type="checkbox"/> orthogonal or perspective views | <input type="checkbox"/> roof & slab tools |
| <input type="checkbox"/> work in wire-frame or solid | <input type="checkbox"/> 3D smart cursor |
| <input type="checkbox"/> walkthrough and flyover tool | <input type="checkbox"/> auto sectioning |
| <input type="checkbox"/> create 3D view from floorplan | <input type="checkbox"/> multiple view |
| <input type="checkbox"/> sweeps, extrusions & meshes | |

Integrated Database/Spreadsheet:

- | | |
|--|---|
| <input type="checkbox"/> attach data to graphic objects | <input type="checkbox"/> create default records |
| <input type="checkbox"/> export reports to text, merge.dif, & sylk | <input type="checkbox"/> auto update reports |
| <input type="checkbox"/> familiar spreadsheet interface | |
| <input type="checkbox"/> search or select by field value | |

Programmability:

- | | |
|--|--|
| <input type="checkbox"/> Over 300 powerful routines | <input type="checkbox"/> no compilation needed |
| <input type="checkbox"/> generate drawings automatically | <input type="checkbox"/> read & write text files |
| <input type="checkbox"/> perform engineering analysis | <input type="checkbox"/> automate repetitive tasks |

Clarisc CAD \$ 899.00

2D CAD:

- | | |
|---|---|
| <input type="checkbox"/> smart walls | <input type="checkbox"/> fillets |
| <input type="checkbox"/> Graphic Guide for locating snaps | <input type="checkbox"/> editable fills |
| <input type="checkbox"/> advanced auto-dimensioning | <input type="checkbox"/> beziers |
| <input type="checkbox"/> editable line styles | <input type="checkbox"/> wall-join |
| <input type="checkbox"/> pan by scroll bars or hand | <input type="checkbox"/> chamfers |
| <input type="checkbox"/> color by object only | <input type="checkbox"/> tolerancing |
| <input type="checkbox"/> DXF translator - extra charge | <input type="checkbox"/> 9 saved views |
| <input type="checkbox"/> unlimited layers | <input type="checkbox"/> hatching |

3D CAD:

none

Integrated Database/Spreadsheet:

none

Programmability:

none

Blueprint 4 \$ 295.00

2D CAD:

- | | |
|--|--|
| <input type="checkbox"/> smart walls | <input type="checkbox"/> fillets |
| <input type="checkbox"/> Smart Cursor for locating snaps | <input type="checkbox"/> editable fills |
| <input type="checkbox"/> advanced auto-dimensioning | <input type="checkbox"/> beziers |
| <input type="checkbox"/> editable line styles | <input type="checkbox"/> wall-join |
| <input type="checkbox"/> pan by scroll bars or hand | <input type="checkbox"/> chamfers |
| <input type="checkbox"/> color by object or layer | <input type="checkbox"/> tolerancing |
| <input type="checkbox"/> DXF translator - free | <input type="checkbox"/> unlimited saved views |
| <input type="checkbox"/> unlimited layers | <input type="checkbox"/> hatching |
| <input type="checkbox"/> global symbol editing | <input type="checkbox"/> on-line prompts |
| <input type="checkbox"/> polylines | <input type="checkbox"/> export EPSF |
| <input type="checkbox"/> unlimited drawing space | <input type="checkbox"/> scale by layer |
| <input type="checkbox"/> file compatible with MiniCad+ | <input type="checkbox"/> classes |
| <input type="checkbox"/> fractional feet & inches option | <input type="checkbox"/> round wall caps |
| <input type="checkbox"/> auto-insert symbols in walls | <input type="checkbox"/> edit inside groups |
| <input type="checkbox"/> hierarchical symbol library | |
| <input type="checkbox"/> add & subtract surfaces | |
| <input type="checkbox"/> pick-up and put-down attributes | |

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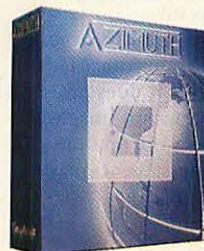
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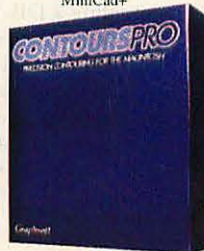
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LapTrack
For the Mac 1.0b

PROS: Excellent time and expense tracking and reporting; lets you combine office and on-the-road use; flexible import, export, and backup options.
CONS: Interface could be better; documentation needs work. **COMPANY:** Timeslips Corporation (508/768-6100). **REQUIRES:** Mac Plus; hard drive; System 6.0.2. **LIST PRICE:** \$79.95.



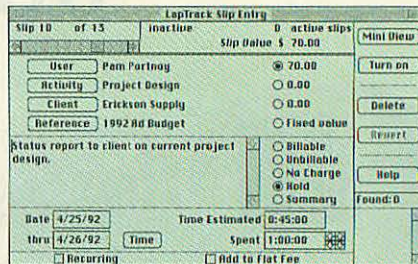
TIMESLIPS CORPORATION HAS DONE an excellent job of taking the key features from Timeslips, its full-size time-and-expense-tracking program, and paring them down for the laptop crowd. LapTrack For the Mac consists of two small programs for on-the-go professionals—LT Reports, for setup and minimal reporting, and LT Data Entry. It also lets you download essential information to a laptop prior to going on the road and upload the new data when you get back to the office.

LapTrack does essentially one thing and does it well—it lets you record, track, and report time and expenses. It's ideal for any person or business—a law firm, a pay-

roll department, a salesperson—that records time-dependent activities or detailed expenses. (For a workgroup, each workstation needs a separate copy.)

With LapTrack, as with Timeslips, you record your data in forms called *timeslips*. Each specifies a time-based charge or expense for a *user*, an *activity*, and a *client*. You can customize the categories to fit your particular business. If you work as a freelance editor, for instance, the user would be you, the editor; the activity an article; and the client an author. Slips can cover almost any imaginable billing situation—fixed and variable rates (up to three rates per user), billable and unbillable charges, recurring charges, charges added to a flat fee, and so on. Including a reference category makes it simple to group charges for each client so that you can track projects easily.

Several data-management capabilities make it easy to take LapTrack on the road. First, you clone the essential data from a centralized database and load it onto your laptop. Away from the office, you enter information as if you were in the office. Then when you're back in the office, you combine the data from the laptop with the centralized database so that both machines reflect the most current information. LapTrack makes this process a breeze. LapTrack also has commands for backing up and restoring data, purging



Entering Timeslips You enter all LapTrack data, into a timeslip, which tallies the charge for user, activity, and client.

old slips, and importing from and exporting to other programs, including Timeslips III, should you need more-sophisticated billing capabilities.

LapTrack is not without flaws. Its interface could be improved. There are too many nested dialog boxes, unusual window conventions, and redundant (and obscure) control keys. For instance, ⌘-Y and option-⌘-A both let you define a new activity. The documentation is sloppy as well. Some menu commands are not in the index, and some setup sections don't tell you which of the two programs they refer to.

In spite of these minor flaws, however, LapTrack does an excellent job. With a first-class interface design and overhauled documentation, LapTrack could be a truly exemplary product.—STEVE MANN

NTSC Interface Board

L-TV

PROS: Inexpensive; includes filtering software for flicker-free images. **CONS:** Weak documentation; sluggish performance with some applications; poor resolution limits practicality of using TV monitor. **COMPANY:** Lapis Technologies (510/748-1600). **REQUIRES:** Mac Color Classic or LC; System 6.0.8; 2.5MB of RAM. Recommended: System 7; 4MB of RAM. **LIST PRICE:** \$349.



THE L-TV IS AN INTERFACE BOARD that allows a Mac LC to use a standard television monitor as a display device. And by hooking the L-TV through a VCR, you can even record your output to videotape.

The L-TV hardware is easy to install. The board snaps into the one Processor Direct Slot (PDS) on the LC's logic board, providing a DB-15 pin connector through the access port on the back of the computer. The supplied video adapter screws into the connector and allows you to connect a standard 75-ohm RCA video cable (not included) to the unit. You connect the video cable to the video-in port on your VCR or television.

The L-TV comes with its own software, TV-Show. This control panel lets you activate the board and shift between Presentation Mode, in which everything on the Mac's monitor is duplicated on the television, and Dual Display Mode, in which the television serves as a second display, capable of having its own windows open.

The software also includes four flicker filters to help stabilize the picture on the television screen. You activate the flicker filters using various option-⌘-number key combinations. The filters do a good job of reducing flicker, though it takes some experimentation to figure out which filters produce the best image for a given application. Some filters reduce flickering but make the stabilized image intolerably fuzzy.

Once you've installed the software and hardware and connected to your VCR or TV, you restart the Mac to use the L-TV. The TV-Show software loads automatically and produces a color test pattern on your television. After a few seconds, the Mac desktop appears and you're ready to work.

But, as one might expect, the quality of the television picture is relatively poor; smaller text—12-point or less—is almost unreadable. Lapis suggests increasing the font size used in Finder windows to at least 14-point. You can also improve the on-screen image by turning down the brightness and contrast settings on the television,

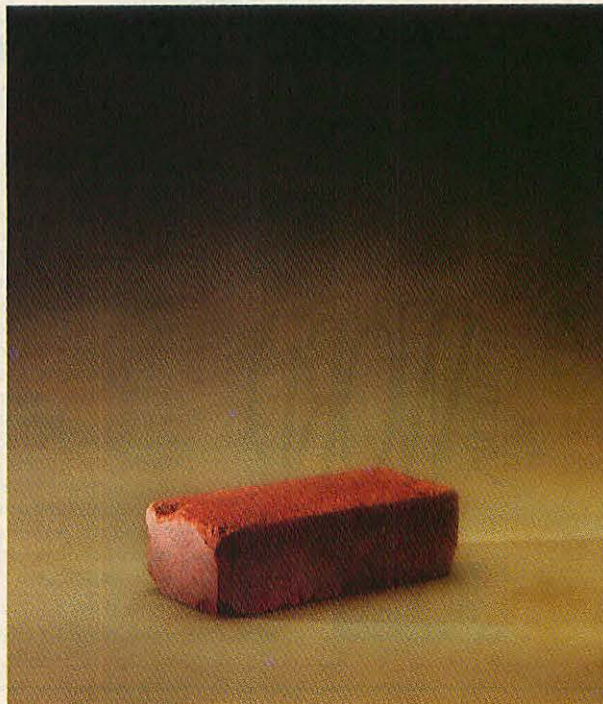
but the results will be somewhat crude.

For this reason, the L-TV's practicality is limited. The bold graphics used in programs such as The Learning Company's Reader Rabbit translate well to the television, but applications involving more intricate operations—word processing, desktop publishing—are impractical. On a 20-inch RCA color TV, I had to use an 18-point New York font to work comfortably.

Another caution: The L-TV is unacceptable for some animation-intensive programs that require frequent screen redraws. For example, running Broderbund's Prince of Persia game on an LC was virtually impossible because the animated sequences on the television screen lagged horribly behind the rest of the program.

TV-Show also has some incompatibilities. One involves versions 1.0 and 1.1.1 of the System 7 Tuner extension. If Tuner is installed, AppleTalk must be active in the Chooser or the system crashes when TV-Show attempts to load. Lapis also warns of possible conflicts with presentations created with Macromedia's Director.

The L-TV is not a high-quality large display or a second monitor for your Mac—nor does it claim to be. But it does provide an economical way to capture images to video and—depending on the application—turn your TV into a passable display device.—JOSEPH SCHORR



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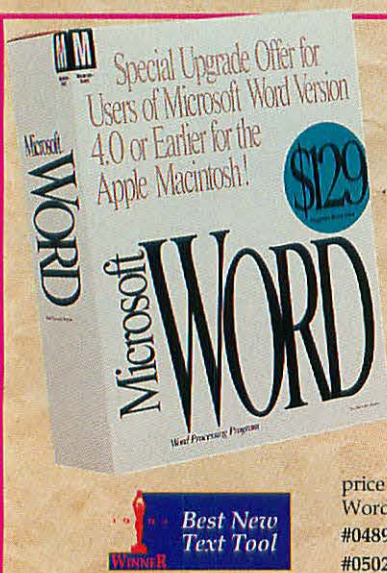
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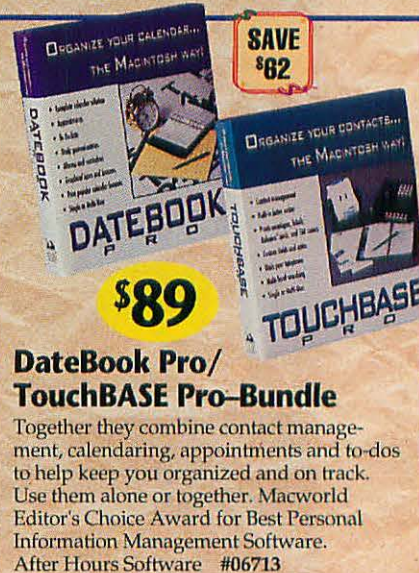
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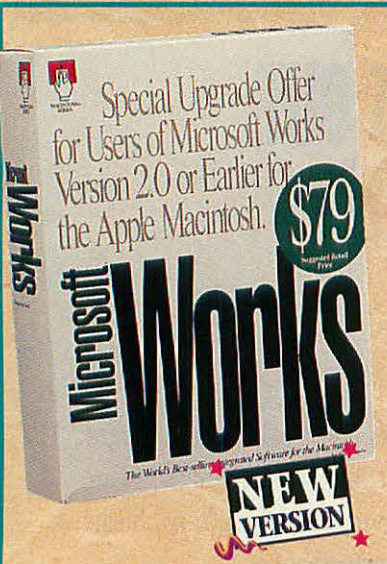


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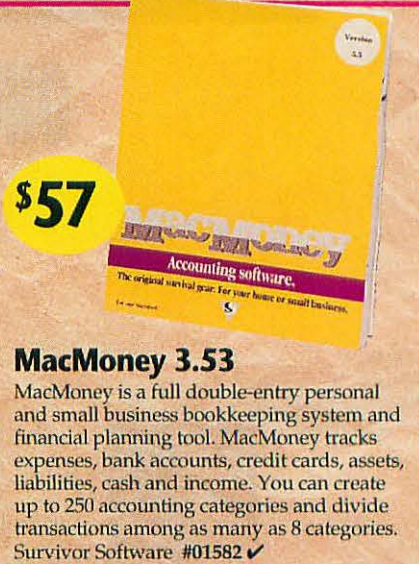
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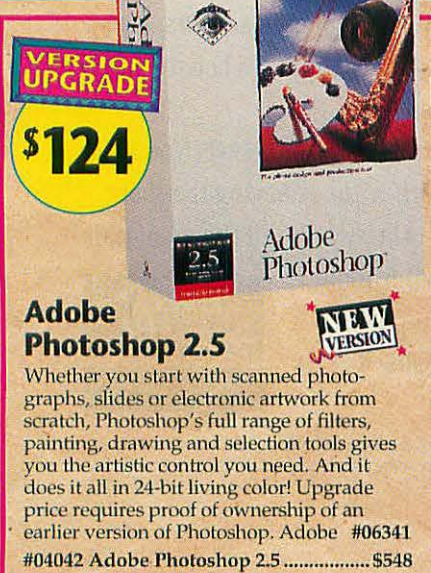
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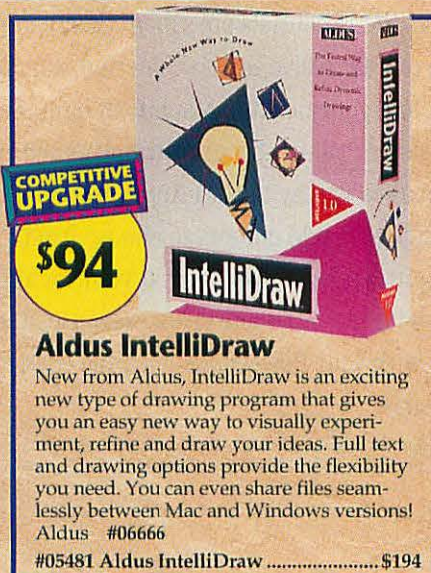
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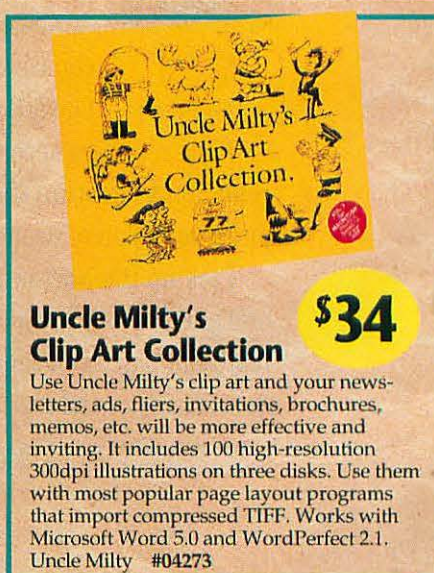
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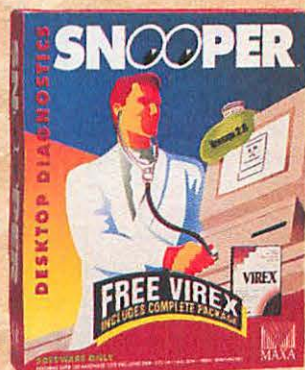
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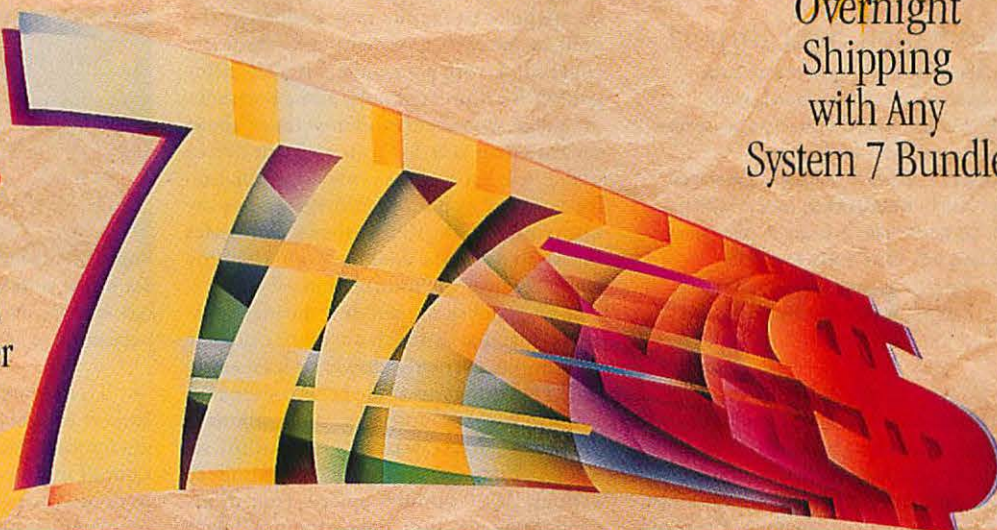
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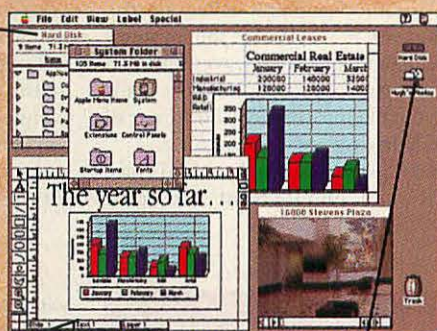
Organizing and accessing files is much easier with the powerful new tools provided in the Finder windows of System 7.1. Click on a folder and the contents of that folder drop down from it instantly. Now you don't have to open a new window every time you wish to check the contents of a folder!

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With System 7.1 you can keep multiple applications open at a time. Copy items into your word processor from your database, one at a time, while both applications are open on your desktop. Open as many applications as you want, then click back and forth between them, instantly!

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With Publish and Subscribe you can create and control live links between imported data and the original documents, so you can create files that are updated automatically to reflect changes made elsewhere.



Share information easily!

If you're part of a network, you can share any folder or volume on your hard disk with other users—without using a dedicated server! Before System 7, you had to purchase hundreds of dollars of software and hardware to do this. Now it's built right in.

Hurry! Offer good only from March 15 — June 30, 1993. FREE freight offer applies only to System 7/Apple partner products purchased together.

Apple Partner Products

Item #	Product	Price	After Rebate	Item #	Product	Price	After Rebate	Item #	Product	Price	After Rebate
Aldus				04197	Playroom 2.0	\$28	\$23	Learning Company			
04121	Gallery Effects	\$128	\$118	05649	Prince Of Persia	\$31	\$26	01856	Reader Rabbit 1	\$35	\$30
05481	Intellidraw	\$194	\$184	04999	Spelunx	\$28	\$23	05070	Reader Rabbit 2	\$34	\$29
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06168	Trivial Pursuit 2.0	\$48	\$38	03481	Mac Tools	\$104	\$84	Microsoft			
Apple Computer				06648	Safe & Sound	\$37	\$27	00227	Excel 4.0	\$294	\$274
06297	Apple Font Pak	\$68	\$53	Chipsoft				02581	Foxbase 2.01	\$328	\$308
05432	Mac PC Exchange	\$68	\$53	06164	MacIn Tax	\$49	\$39	01220	Powerpoint 3.0	\$328	\$308
Berkley				Claris				04161	Project 3.0	\$444	\$424
02785	After Dark	\$28	\$23	05749	Claris Works Version 2	\$196	\$181	04898	Word 5.1	\$294	\$274
05934	After Dark: Star Trek	\$35	\$30	03478	FileMaker Pro 2.0	\$268	\$258	00567	Works 3.0	\$158	\$138
Broderbund				06290	MacWrite II	\$88	\$78	Symantec			
03970	Bannermania	\$28	\$23	06525	MacWrite Pro	\$174	\$154	04890	Norton Utilities 2.0	\$94	\$74
03994	Kid Pix	\$33	\$28	Diva				00116	SAM 3.5	\$64	\$49
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04328	MacGlobe	\$38	\$33	04230	Quicken Mac	\$42	\$37	03972	WordPerfect Mac 2.1	\$278	\$258
								06303	WordPerfect Works 1.2	\$158	\$148

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CODE #30502

TAKE OFF WITH SYSTEM 7 AND THE MAC ZONE

Murder-Mystery Game

Who Killed Sam Rupert

PROS: Logical solution; good use of QuickTime; surprisingly solid dialogue and acting.

CONS: Time limit hampers game; no pause feature; may be unsuitable for children.

COMPANY: Creative Multimedia Corporation (503/241-4351). **REQUIRES:** Mac II; 4MB of RAM; CD ROM drive; 8-bit color; color monitor; System 6.0.7. **LIST PRICE:** \$39.99.



MOST MURDER-MYSTERY GAMES ARE based on a single principle: mislead the player. Introduce a bunch of suspects, make them out to be arrogant, manipulative creeps, then hinge the solution on a last-minute piece of evidence that pins the blame squarely on some sweet soul who wouldn't hurt a fly. If you hate that type of game, you'll like *Who Killed Sam Rupert*.

This interactive game takes all the information you need to solve the mystery, hides it evenhandedly, then leaves it to you to uncover it. Sure, you run into false leads and questionable information, but the trail is ultimately logical and entertaining.

QuickTime movies, synchronized voice and music, and hundreds of 256-color

images create the virtual murder. You're a police detective trying to solve the murder of a popular restaurateur by evaluating the guilt or innocence of eight suspects while contending with a nagging chief, a contingent of local press ghouls, and a persnickety judge who seems to know more about the case than you do. Your assistant detective, Lucie Fairwell, assembles information for you, makes phone calls, videotapes the interviews with the suspects, provides hints—in short, she does the work while you ruminate over the information.

The trick is to interview the eight suspects, marshal as much ancillary evidence as possible, correctly answer at least seven out of ten questions at the press conference, reinterview key suspects, and submit a defensible arrest warrant—all within six hours. Time is measured according to actions. At 20 minutes apiece, your interviews leave you little opportunity to check alibis, inspect the scene of the crime, read the autopsy report, procure lab tests, and track down all the other details.

There are ways to save time. You can save your place (using an undocumented technique—click on the dimmed clock icon in the opening screen) and pursue one avenue of clues, then return to the saved time and pursue another avenue of clues. You can even cheat by using a word processor to alter the time value in a saved file.



Six Hours with the Deceased The point-and-click interface lets you investigate clues in any order but each bit of information costs you time.

To its immense credit, *Who Killed Sam Rupert* exploits the full range of multimedia options. The acting and dialogue in the QuickTime movies are more than adequate to draw you into the story. And though the press conference scene is pure contrivance ("Is the medulla oblongata part of the brain?" asks one intrepid reporter), the trail to the murderer provides a wealth of clues and surprises to hold your interest.

The game cries out for a pause feature for times when real life rears its ugly head. Also, a smidgen of cursing and some mention of anatomical details may make the game unfit for the kiddos. But you'll probably be pleased at how much fun you have tracking the killer.—DEKE MCCLELLAND

CD ROM Detective Game

Sherlock Holmes, Consulting Detective, Volume II

PROS: Superb video sequences; games in progress can be saved. **CONS:** Needs more detail in reporting scores and a more useful notebook feature. **COMPANY:** Icom Simulations (708/520-4440). **REQUIRES:** Mac LC; 2MB of RAM; 256-color monitor; CD ROM drive with 380ms access time and 150K data-transfer rate; System 6.0.7; 32-bit QuickDraw. **LIST PRICE:** \$69.95.



IN SHERLOCK HOLMES, CONSULTING Detective, Volume II, you match wits with Sir Arthur Conan Doyle's legendary detective by attempting to solve three difficult mysteries. After questioning suspects and gathering clues, you bring each case before a judge, who asks questions to determine if you know who committed the crime and why.

Each game starts with a brief movie in which a key individual is questioned by Sherlock Holmes and provides background information about the crime. You then

select icons to initiate actions. From the top left of the main screen the various icons let you return to the main menu; examine the Notebook; open a Directory of characters and locations; read articles in the *London Times*; travel to different locations; check Holmes's files for background info; send out the Baker Street Irregulars—a group of rag-tag messengers—to collect clues; or meet with the judge. The Carriage icon has splendid cinematic scenes in which Holmes or Watson interviews key characters.

Any name or location in the Directory can be copied into the Notebook, to create a less cluttered record of the people you've met or intend to question. Unfortunately, the Notebook isn't designed for real note-taking. You need to use a notepad DA or paper and pencil to record the wealth of information you uncover.

Although solving the crime is the main objective, how well you do is based on the resources you use. Each time you consult Holmes's files, send out the Irregulars, or travel to a location, points are added to your score. The fewer points you accumulate, the better a detective you are.

Whether you enjoy Sherlock Holmes, Consulting Detective, Volume II, depends on your need for autonomy. Some players may feel they don't have sufficient control. For example, you don't direct the questioning—you only decide whom to question

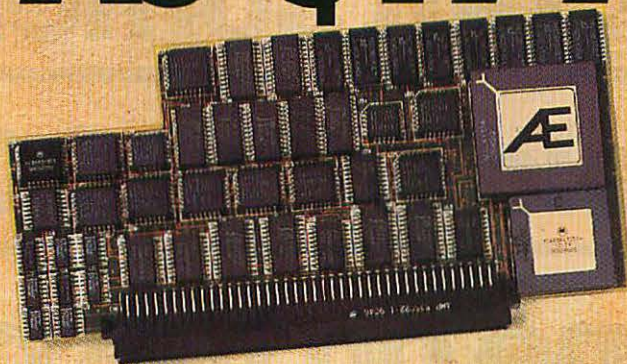


The Notebook The Notebook is a convenient place to store the names of important people and places. Most of the first page is already filled with the names of the Baker Street Regulars—helpful contacts such as Inspector Lestrade of Scotland Yard.

and where to go. And the point at which the mystery can be solved isn't entirely up to you; if the judge feels you are still missing critical clues, he sends you back to continue your investigation. Finally, although a file explains the scoring, the program ought to explain where your score and Holmes's score differ. (I know I did badly, but I want to know what I should have done.)

If you like a good mystery, though, you'll enjoy the game. The three stories aren't straightforward, and you have to interrogate many individuals before you can confidently assemble the pieces of the puzzles.—STEVEN SCHWARTZ

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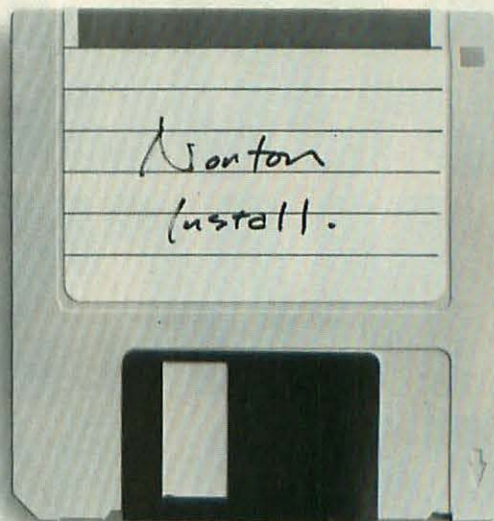
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Once upon a ROM

BY DAVID POGUE

OUR FAVORITE COMPUTER company is betting on CD ROM—compact discs designed for the computer. These plastic 600MB discs play not just music but video, text, speech, and anything else people feel like handing you on a silver platter. As soon as Apple started building CD ROM players into its latest Macs, new discs began gushing onto the market. Many of them fall into a new entertainment category: interactive fiction, in which you're a character with control over the pace, if not the direction, of the plot.

But there are two reasons that CD ROM may not be everything you've ever wanted to slide into your Mac. First of all, CDs have all the pep of a tranquilized slug. Click on a button and you sometimes have to wait the worst part of a minute before anything happens on the screen. Unfortunately, such a response puts something of a damper on that white-knuckled, heart-throbbing tempo you'd want in your interactive adventures.

The new dual-speed drives from Apple, NEC, and Toshiba help the speed problem, if only slightly. But there's a second issue: content. Do you know how much 600MB is? If you laid out that many floppy disks end to end, they'd stretch halfway across Microsoft's parking lot. The challenge, then, is to do something useful with that potential. On the participatory-story bookshelf, few have ventured much beyond the safe bounds of two categories: comic books come to life, and solve-the-mystery games. (Note: Most of these require a color Mac—for some, a 13-inch monitor is the minimum size—and at least 5MB of memory.)

Spaceship Warlock

SPACESHIP WARLOCK WAS AMONG THE first interactive CDs (\$95; Reactor, 312/573-0800). In this hi-sci space opera, you wake up, try to figure out your unfamiliar futuristic surroundings, and soon realize that you're the sole defense against hostile aliens from space that threaten to mess up life as we know it. I think we all know that feeling.

You amble through your richly painted, simplified-floor-plan universe,

navigating gorgeous 3-D rooms, hallways, and space cruisers by clicking the mouse. You meet a cast of colorful characters, like Hammer, the eye-patched space pirate, and you rocket forth into a tale of star travel and intergalactic politics. More than any other interactive story, Spaceship Warlock feels like a movie: there are fancy special effects; you converse with other characters (by typing); and your wanderings are accompanied by a percussive cosmo-punk sound track. And regardless of your gender, you get the girl at the end.

In terms of character development, *The Color Purple* it ain't. And I don't much care for getting repeatedly killed by some unexpected space bully. But the sheer imagination poured into this disc will keep you absorbed for about 12 hours of red-blooded space anarchy.

The Journeyman Project

IN THIS HI-SCI SPACE OPERA, YOU WAKE up, try to figure out your unfamiliar futuristic surroundings, and soon realize that you're the sole defense against hostile aliens from space that threaten to mess up life as we know it.

The Journeyman Project (\$99.95; Presto Studios, 619/689-4895) creates a whole new world, immaculately and stunningly conceived. Your photo-realistic surroundings have light, depth, and body. Details have been sweated. (Check out the Mood Walls in your futuristic apartment: you can dial up Seascape, Whispering Leaves, or any other soothing rear-projection scenes.)

The premise is neat: some scientist has invented a time machine, now kept under lock and nine-digit password. After all, reckless time travel, as we know from *Back to the Future*, can change history in hideous and unpredictable ways (hair-styles being the prominent example on this disc). And now somebody has stuck a finger into the great faucet of time; you must go back to the critical temporal splatters and clean up the mess.

Note well: This game is the slowest in a very slow medium. (The manual optimistically suggests that you grab a

handy 400MB hard drive and copy the game onto it for faster performance.) Worse—for me, anyway—is that your character keeps getting killed arbitrarily until you've learned the game's idiosyncrasies. Just once, couldn't somebody create a world as rich as *The Journeyman Project*, without making it so gosh-darned hard to stay alive to see it?

L-Zone

MY MOTHER ALWAYS SAID: "BE CAREFUL what you wish for. You might get it." In L-Zone, you don't die; in fact, you don't meet any other characters at all. You find yourself deposited in yet another futuristic *Omni* magazine cover, with absolutely nothing to do but walk around, all by yourself, and admire room after room of gleaming abandoned machinery. It's *Home Alone 10*.

L-Zone (\$99; East West Distribution, 213/848-8436) is from Japan, so to keep it marketable here, it has no dialogue or text. (Except for the Read Me document: "All operation you have to do is drag this QuickTime file into your system folder." Right.) You're free from the risks and rigors of typical futuristic space fantasy. In fact, after wandering around Planet Dullsville for a while, you wish a few murderous space bullies would liven things up.

Alice in Blendoland

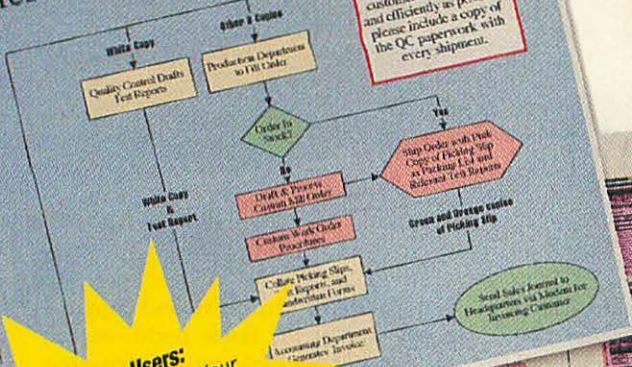
THE EXPLORATION-LOVING 3-D GRAPHICS artists who brought you L-Zone appear also to have had a hand in this similarly aimless disc (same company and price). Alice (\$69.95; Greg Brown Associates, 714/673-4301) is a modern, hallucinatory, museum-like wonderland. Just as in L-Zone, there is no plot, no end point, no characters; Alice is primarily an exercise in weirdness. You wander through art galleries; when you click on furniture, walls, doors, and paintings, oddball things happen. You get small, or big. R-rated goings-on appear. The guy in a portrait starts vomiting grapes. Makes ya glad you dropped \$400 on a CD ROM player, don't it?

continues



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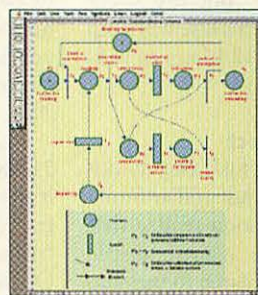
Simply drag pre-drawn symbols onto a page and connect with curved or straight lines. Place text in symbols and on lines, as well as in freestanding notes. Change the chart as desired; lines stretch and stay attached to symbols. Even create stand-alone flowcharts that can be freely distributed to any Macintosh user (and any Windows user with an optional viewer). MacFlow is also System 7-savvy, letting you publish your charts and subscribe to text. Translate to and from text in ASCII and RTF formats as well as outlines created in Acta 7 and MORE.

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MacUser Magazine July '91



MacSchedule 3.0 Project Planning and Tracking

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Who Killed Sam Rupert

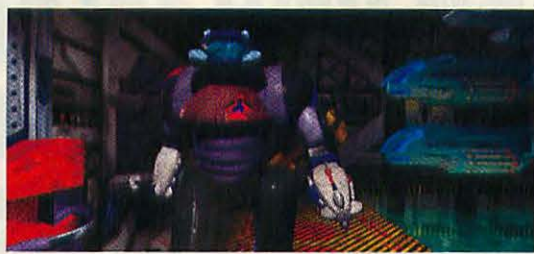
A CALIFORNIA YUPPIE HAS BEEN KILLED in his own restaurant. He's got a \$42,000 diamond ring still in his pocket, a hatpin in his neck, and eight shifty-looking friends. Your job is to figure out whodunit and whydunit—and you have only six hours (\$39.99; Creative Multimedia, 503/241-4351).

You interview the suspects, played by actors ranging from hopeless to outstanding; their replies come in the form of QuickTime movies, which are great fun to watch. You can listen to Sam's answering machine, look over his reservations computer, read crime-lab reports, and so on. The solution, while not requiring Mensa mentality, is fun to ferret out.

About this six-hours gimmick, though: it's not six *actual* hours, but six *virtual* hours. Every time you check a source, the program deducts time from your six-hour countdown. You have no way of knowing how much it'll subtract for a certain inquiry, and no way to say "Oh, in that case, forget it." I used up my "six hours" in about one real hour, and needed another "six" to solve the mystery. Nonetheless, the disc is done with maximum realism and minimum pointless game-gimmicks. And it's relatively cheap.

Sherlock Holmes, Consulting Detective (Volumes I and II)

EACH OF THESE CDS GIVES YOU THREE mystery-story bangs for the buck (69.95 bucks, actually; Icom Simulations, 708/520-4440). After you watch a movie clip of some British guys sitting around in consternation discussing a crime that's just occurred, you get a list of about 200 names. For each name, you read a message from your scouts (the Baker Street Irregulars); look in Sherlock's files; or, for some names in the list, play a movie clip of Sherlock's interview. You piece to-



Mr. Personality You meet some pretty out-there folks on your journey, man, through The Journeyman Project. Take this cheerful-looking robot, for example, who inhabits one of the disc's many gleaming high-tech interiors.

gether surprisingly complex plots, motivations, and personalities.

The video clips deserve special mention. They're nothing like typically tiny, jerky QuickTime movies. Though the image quality is blocky, the picture fills a good part of your screen, and the motion is unbelievably smooth and cinematic. How did the programmers achieve such smooth video from such a slow disc?

However, there's more to frustrate you than solving tough crimes. Many of the 200 names are dead ends; you get awfully tired of hearing an actor explain that somebody "knew nothing about this case." My biggest gripe, however, is that the program, not you, determines when you've solved the case. If you haven't yet watched a scene the program considers vital to the case—even if you already know what it'll tell you—you won't be admitted to the courtroom, where you prove you've cracked the case. The movie clips and the plots are great; too bad the simple mechanics of the game—all that waiting and repetition—dilute their impact.

The Vampire's Coffin

IF SPACESHIP WARLOCK IS A COMIC book, and Sherlock Holmes is "Masterpiece Theatre," then this disc is a Saturday morning cartoon (\$59.95; Sanctuary

Woods Multimedia, 604/380-7582). It's a somewhat confused tale of a guy in a white jumpsuit (do you remember Speed Racer?) and his talking dog (remember Scooby-Doo?). For some reason, they're assigned to go back in time to Transylvania to retrieve Count Dracula's coffin. Or something.

This one seems to have been designed for young teenagers, as evidenced by the lame dialogue ("Man, is that thing nasty-looking, or what?" "After you, scaredy-cat."). The faux-Goofy character voices are goofy; and while the painted illustrations are state-of-the-Saturday-morning-art, there's almost no animation. But jeez, it's no fair to judge this disc against the standards of grown-ups' discs. I haven't quite forgotten what it's like to be 13; I guess if The Vampire's Coffin were my first CD ROM, I'd probably love it.

The Madness of Roland

ARTIST/COMPOSER/WRITER/PROGRAMMER/actor Greg Roach genuinely tried to do something groundbreaking with this disc (\$59.95; HyperBole Studios, 713/529-9696). It *is* interactive, and it *is* a story, but you don't really affect the tale's outcome. Instead, you read text as it's spoken by actors. Along the way, you can switch to another character's viewpoint, watch some peripherally related movie clips, or jump to another part of the story.

The problem—and it's a whopper—is the content: vulgar, confusing, ungrammatical. And oh, it art pretentious. "I have many brethren, but no kin." Profound, dude. As soon as a naked guy got fully frontal on my screen, but before I read the term *bitchmeat* applied to women again, I realized that this ground should probably remain unbroken.

The Upshot

THE TWO SPACE ADVENTURES MAKE the best use of the medium: Spaceship Warlock for its music and characters, and The Journeyman Project for its visuals and story line. If they strike you more as space idiocy than odyssey, then try one of the crime-solving discs, or hold out a few months for an influx of new titles. And then, in the words of the L-Zone Read Me file, "Have a nice trip we invite you to." **m**

Contributing editor DAVID POGUE is an interactive fiction author: read his \$5 Macintosh thriller, *Hard Drive* (Berkley Publishing Group, 1993), and then interact with him by E-mail on America Online.

Other Disks, Rated G and X

The industry wags are probably thinking: What's gotten into this kid? In a review of interactive CDs, how come there's no mention of the very best discs on the planet?

The wags refer, of course, to Brøderbund's intoxicating and imaginative Living Books, of which there are now two: Arthur's Teacher Trouble (\$59.95) and its predecessor, Just Grandma and Me (\$49.95). I didn't cover them because they're designed for kids. But heavens, are they great! Each is modeled on a previously published children's book (included with the disc). On each page, every tiny detail of the illustration has been programmed to do something hilarious when clicked. In a spasm of crinkling sounds, a piece of paper folds itself into a paper airplane and zooms away. Click on the door of the Science Room, and an unsteady finger writes out **3M 9J3H** on the inside of the fogged-up glass. Don't be embarrassed to work out a time-sharing arrangement with your kid.

There's a second category of discs I didn't bother with: the handful of, er, adult seedy ROM discs like Virtual Valerie (Reactor). I guess they're interactive fiction, all right, but probably not the kind you want to read about in *Macworld*.

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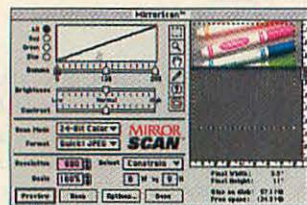
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ColdScan

Feeling chilly? Must be these new cold-lamp flatbed scanners. Relisys's cold-lamps make encapsulated optics possible, and cooling fans unnecessary. Maximum scanning area for all models is 8½ by 14 inches. All models feature three-pass technology and 8-bit gray scale, with both color models offering 24-bit color. Scanners bundled with Adobe Photoshop. ColdScan 800 (400-dpi optical color) \$1995; 600 (300-dpi optical color) \$1795; 600G (300-dpi optical gray-scale) \$1195. Relisys, 408/945-9000, 800/783-2333; fax 408/945-0587.



ColdScan

DATdisk-1000

From the living room to the computer room, digital audiotape (DAT) is coming. The DATdisk-1000 is a 1GB, 4mm DAT system with a 20-second average access time and 1.38K-per-second average transfer speed, according to the manufacturer. System supports read-write applications and can be mounted on the Finder desktop for quick viewing and updates. \$3395. MicroNet, 714/837-6033; fax 714/837-1164.

DisplayNet

Have your net and see it, too. Combination Ethernet and video-interface board supports monochrome Lapis Full Page Display and Two Page Display in black-and-white, also Apple Portrait Display (monochrome); twisted-pair 10BaseT and ThinNet Ethernet connec-

tions. Compatible with SE/30, LC family, II family, Quadras, and Performa 400 and 600. \$549. Lapis Technologies, 510/748-1600, 800/435-2747; fax 510/748-1645.

Focus 2.1g

They're husky hard drives, weighing in at 560MB, 1GB, and 1.2GB. Drives feature Micropolis mechanisms; a five-year warranty; and come bundled with Complete Undelete, DiskMaker, Virex, and Citadel. User has choice of vertical or horizontal case, in black or platinum. According to the company, average access times range from 10ms to 13ms, and sustained data-transfer rates range from 3MB to 5MB per second. 560MB \$1199; 1GB \$1799; 2.1GB \$2749. Focus Enhancements, 617/938-8088, 800/538-8866; fax 617/938-7741.

M21LMuMax

This 21-inch gray-scale monitor has protective shielding to allow proper operation in areas where stray magnetic fields, such as X rays, exist. Circuitry allows monitor to adjust dynamically to horizontal frequencies between 48KHz and 105KHz (15KHz and 65KHz for model M21LMuMaxV65). Offers horizontal resolution of 1024 to 2048 (320 to 1280 for M21LMuMaxV65) and vertical resolution of 768 to 1536 (250 to 1024 for M21LMuMaxV65). Both models have a vertical frequency range of 55KHz to 90KHz. Requires Mac II series computer. \$5950; M21LMuMaxV65 \$6150. Image Systems, 612/935-1171; fax 612/935-1386.

MacPlot Raster

Chooser-level driver and NuBus board that supports the Encad NovaJet and Hewlett-Packard DesignJet plotters using RTL (Hewlett-Packard's Raster Transfer Language). Product supports over 250,000 colors or 65 shades of gray, custom paper sizes, and network spooling. Plot-to-disk feature available. 30MB hard drive space required. Requires Mac II series or Quadra. 8MB min. memory. \$1295. Microspot USA, 408/253-2000, 800/622-7568; fax 408/253-2055.



MacPlot Raster

Massfm 144

Burn up the phone lines with this 14,400-bps fax modem. The Massfm 144 adds an answering system with a user-recorded greeting and remote message retrieval. Messages are compressed, saved to a hard drive, and date/time stamped. An unlimited number of users can access the Massfm 144N across a network. All Massfm modems are bundled with Faxstf software by STF. All support MNP Classes 1 through 5, v.42/v.42bis, and v.32/v.32bis. Massfm 144 \$449; Massfm 144N \$769; Massfmv \$649. Mass Microsystems, 408/522-1200, 800/522-7979; fax 408/733-5499.

Micropolis Drives

Size-large drives for size-large storage. The half-height 500MB and 1.2GB drives fit into many late-model modular Macs; full-height 2.4GB drives can be installed in the Mac Quadra 900 and 950. Drives feature average seek times of 9.4ms and sustained data-transfer rates approaching 4MB per second, according to the company. 500MB internal \$1299, external \$1369; 1.2GB internal \$1999, external \$2069; 2.4GB internal \$2899, external \$2999. APS, 816/478-8300, 800/235-2752; fax 816/478-4596.



Micropolis Drives

OrangePC

MS-DOS NuBus coprocessor board allows user to run Mac and PC programs simultaneously. Includes VGA controller chip, Windows 3.1 compatibility. With 386SX/25 MHz \$1099; with 386SX/25 MHz with AT bus slot, PC serial and parallel ports, and 2MB of memory (expandable to 16MB) \$1499; with 486SLC-25, AT bus slot, and 2MB of on-board memory (expandable to 16MB) \$1799. Orange Micro, 714/779-2772; fax 714/779-9332.

Ovation 810 and 820

A color, active matrix LCD projection panel with digital video capability. The panel decodes NTSC, PAL, and SECAM video input. The Ovation 810 has the same features without the video capa-

bility. Both panels have an 8.4-inch display area and are intended for smaller audiences. Ovation 810, \$4995; Ovation 820, \$5695. Proxima Corp., 619/457-5500, 800/447-7694; fax 619/457-9647.



Ovation 820

Speedster

Power-hungry? This accelerator board plugs directly into the Mac IIci and Performa 600 Processor Direct Slot; the IIsi and SE/30 require an available adapter; and adapters for the II, IIfx, IIfx, LC, LC II, and Performa 400 will be available soon. The board also features an expansion connector for optional 128K high-speed static RAM cache card. 25MHz \$799, with FPU \$1099; 33MHz \$999, with FPU \$1299; 40MHz with FPU \$1499. Mobius Technologies, 510/654-0556, 800/523-7933; fax 510/654-2834.

XL1500

Let there be phone lines and there shall be networks. Proprietary noise-reduction hardware allows these repeaters to connect Ethernet networks between buildings at distances of up to 1500 feet using existing UTP Level-2 wire. Models available with thin Ethernet (BNC), thick Ethernet (AUI), and 10BaseT (UTP) connections. XL1500 \$1999; XL1502 \$1999; XL1503 \$1499; XL1504 \$3999. Prices are for single units; models sold only in pairs. Tutankhamon Electronics, 510/682-6510, 800/998-4888; fax 510/682-4125.

SOFTWARE

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Timely software for the turbulent nineties job market. Product helps organize a job search and motivates the user with music, humor, graphics, and digitized speech. Program features a national 500-company database, a contact organizer, résumé and cover-letter templates, a research module, a calendar, a to-do list, and a scheduler. 2.5MB min. memory. *continues*

\$99. Up Software, 415/921-4691; fax 415/921-0939.

Brody's Dictionary of Medical Terms

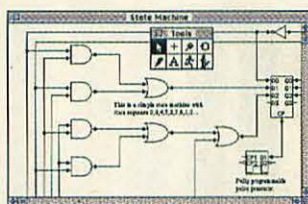
Dictionary contains over 40,000 medical definitions that can be popped up from any word processor. A reverse-search feature finds words whose definitions contain a given set of words; the program also provides wild card searching and batch-file searching, which looks up the definitions of all the words in a text file and puts those definitions in a separate file. 1MB min. memory. \$59.95. Inductel, 408/866-8016; fax 408/243-1762.

Chameleon

Interior decor for the Macintosh. Desktop-pattern utility is a stand-alone application that provides instant access to 256 patterns. Includes pattern editor, import/export capabilities, and over 100 Artbeats patterns. Requires System 7.1 and a hard drive. 4MB min. memory. \$59.95. Logical Solutions, 612/659-2495, 800/645-2495; fax 612/659-2498.

CircuitMaker

Circuit schematic software allows user to draw, modify, combine, and test digital circuits. Features a device library (including TTL and CMOS devices, gates, flip-flops, and switches), the ability to move wires and devices while maintaining circuit integrity, text-documentation capabilities, and devices that are customizable via macro. 2MB min.



CircuitMaker

memory. \$200; demo disk \$10. Micro-Code Engineering, 801/226-4470; fax 801/226-6532.

DPI-On-The-Fly

Display mode switching for Quadra users with MultiSync Plus, XL, 4D, 5D, and FG series monitors. Users select 640 by 480, 832 by 624, or 1152 by 870 resolution via Options in the Monitors control panel. Users must close applications and switch from the Finder but do not need to restart their systems. Free for registered owners of NEC's MultiSync monitors. NEC, 708/860-9500, 800/388-8888; fax 708/860-5618.

HyperScale

HyperCard stack teaches guitar players how to play scales. Guitarist can hear notes seen on fretboard display and relate them to notes on a musical staff. Product shows a full 24-fret fretboard; each note in the selected scale is labeled with either note name or scale degree. Comes with run-time version of HyperCard. 2MB min. memory. \$39.95. Gadden Musical Instruments, 503/

624-9309, 800/582-2297; fax 503/624-9309.

Icon 7

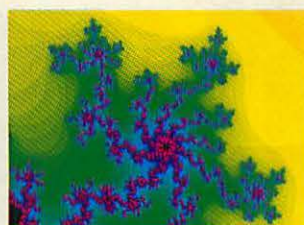
System 7 color icon creator and editor. Includes a 17-tool palette; image rotation; and editing in black and white, 16, and 256 colors. Software allows editing of all eight members of the icon family, and will automatically shrink icons to the small icon format. Requires System 7. 2MB min. memory. \$79.95. Inline Design, 203/435-4995, 800/453-7671; fax 203/435-1091.

InfoLog

The next leg of the paper chase is this document-logging and -tracking system. Users label each document with a serial number, log the document by entering keywords that describe the document, file the document in serial-number order, and then retrieve the document by searching the database by keyword. 2MB min. memory. \$149. Connectix Corp., 415/571-5100, 800/950-5880; fax 415/571-5195.

Kaleidoscope

Who says that science can't look cool? This fractal-art generator features the Mandelbrot set in living color. Users can zoom in on infinite detail, cycle the colors for an illusion of motion, and generate pictures for use as illustrations, clip art, or desktop patterns. 1MB min. memory. \$49. Abbott Systems, 914/747-3116, 800/552-9157; fax 914/747-9115.



Kaleidoscope

KopyKat

This INIT (called an extension under System 7) allows multiple clipboards. After you issue a Kut or Kopy command (commands replace the standard Cut and Copy), product adds a hierarchical submenu of clips to the Paste command. Requires MultiFinder under System 6.0.2 or later. 2.5MB min. memory. \$89. Cra Z Software, 508/521-5262; no fax.

Lido 7

Disk-management utility that allows a user to format and initialize any disk storage device on the Mac. Supports devices from 8-inch hard drives, to removable-cartridge drives, to magneto-optical and floptical mechanisms. Company claims that product allows user to re-size partitions without losing data. Features include Defect Management tests and a system INIT or extension that detects and mounts removable-media cartridges. 1MB min. memory. \$95. Surf City Software, 714/289-8543; fax 714/289-1002.

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MediClip

Dem bones, dem bones, dem dry bones. A series of images of medical anatomy and art: Anatomy Volumes I and II and Medical Art & Instruments Volume I cover all major anatomical systems and organs, as well as the most popularly used art, symbols, and instruments of the medical world. Other volumes to follow. Specify graphics format when ordering. \$99 per volume. Alpha Media, 310/315-3470, 800/736-1567; fax 310/315-1983.



Memorize It

Memorize It

Have trouble remembering the good stuff? Memorize It allows you to create decks of flash cards with text, pictures, and sound. Product ships with decks on topics such as Foreign Language (Spanish, French, and German), Art History, Mathematics, and Chemistry. 1MB min. memory. \$35. Side Eight, 714/952-4114; no fax.

Mpower 701

An interface kit for Kodak Diconix 701 portable ink-jet printer consists of a Mac

printer driver and a serial-to-parallel cable. \$79. Eastman Kodak Company, 716/724-4000; fax 716/724-0663.

Oxyd

Arcade/strategy game stars captive, oxygen-producing Oxyds and the gamer as a heroic marble, determined to save the computer universe. Player must open Oxyds of like patterns or colors sequentially. Obstacles include objects to be moved, puzzles to be solved, and instant destruction by death's-heads and flying rotors. Users can try the first ten levels for the cost of a disk but must purchase a code manual to progress further. 2MB min. memory. 1.44MB disk \$4; code manual \$39. Dangleware Publishing, 617/497-1130, 800/228-6993; fax 617/497-1130.

Pararena 2.0

Futuristic sports-simulation game gives players the choice between playing against the computer or against one other player on a network. Player selects a champion, who glides on a hover board across the surface of a disk trying to bump, push, or knock a ball into a goal or into the other player. 1MB min. memory. \$59.95. Casady & Greene, 408/484-9228, 800/359-4920; fax 408/484-9218.

ParaRisk Administrator

High-end information system for risk managers and claims adjusters. Features claims tracking with up to five organizational levels, payment processing, re-

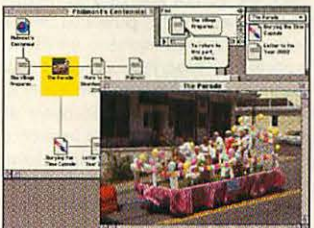
serve tracking, customizable form letters and claimant records, and availability of all data in report or graph format. System displays paper forms for easy navigation; all administrative operations center around an electronic claims folder. Tracker is a scaled-down version for self-insured companies that might not administer claims. Cost includes five days of on-site training. Recommended: 11si or greater with 5MB of RAM, 40MB of free space on hard drive. \$25,000; Tracker version \$15,000. Paradigm Infosystems, 206/486-2956, 800/637-5766; fax 206/486-3173.

PC Rx 2.5

Three-in-one antivirus program scans and removes viruses on DOS, Windows, and Macintosh platforms. 1MB min. memory. \$69. Trend Micro Devices, 310/782-8190, 800/228-5651; fax 310/328-5892.

Philmont Symposium System

Two-part multimedia presentation-creation system. Allows integration of



Philmont Symposium System

QuickTime movies, HyperCard stacks, PICTs, Kodak Photo CDs, and text files. Possible uses: training, electronic publishing, interactive kiosks. Requires System 7. 2MB min. memory. \$75. The Philmont Software Mill, 518/672-4890, 800/527-9199; no fax.

PlayWrite

How tedious is formatting a theatrical script? This package intuitively adjusts scene heads, dialog, and other script elements to meet accepted entertainment-industry standards for margins, spacing, and capitalization. PlayWrite features automatic backup and macros for frequently typed words or phrases. 1MB min. memory. \$245. PlayWrite Systems, 818/304-6808, 800/627-5297; no fax.

Signature Font

Send your signature to SignaFont Designs and get back a PostScript Type 1 and TrueType font containing an electronically rendered version of your John Hancock. First-name signature and/or initials available at an extra charge. Compatible with Adobe Type Manager. 1MB min. memory. \$40. SignaFont Designs, 303/355-9137; fax 303/355-3202.

SkyClock

Consult the stars from the safety of your Macintosh. SkyClock allows you to cast charts in several different astrological formats, including Western Wheel, Bi-Wheel, and Vedic. Real-time horary clock displays the current positions continues



MACWORLD



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VisualClips

What good's a new technology if it doesn't generate widgets for the Mac desktop? VisualClips bundles a set of QuickTime movie clips with QuickTime and VideoBee, a control panel that triggers preselected QuickTime clips when certain system events are activated, such as opening or closing a window or ejecting a disk. The VisualClips Starter Kit in-

cludes MoviePlayer for clip editing, a set of clips featuring home video examples, and clips tailored to the VideoBee event list. Star Wars Visual Clips features (amazingly enough) scenes from the movie *Star Wars*. 4MB min. memory. Starter Kit \$69.95, Star Wars \$89.95. Sound Source, Unlimited, 805/494-9996, 800/877-4778; fax 805/495-0016.

Yearn 2 Learn: Peanuts

Say goodbye to invisible grownups and wah-wah talk, because the Peanuts gang is teaching school. Snoopy, Woodstock, and the regular cast of Peanuts characters lead kids through math, U.S. geography, reading, and coloring exercises. There's also a dodge-'em-style arcade game, featuring the World War I Flying Ace in his Sopwith Camel. Requires Quadra, Performa, or II series Mac with 256 colors, and 11MB of hard drive space. 4MB min. memory. \$64.95. Image Smith, 310/325-1429, 800/876-6679; fax 310/539-9784.

Zounds

From the gizmos and gadgets department comes a control panel that creates fantasy sound environments while you work at your Mac. Product comes with several modules, ranging from Aviary to Hard Work and Swamps. Software allows user to set volume and frequency of sounds, and modular design allows users to mix and match sound clips. 1MB min. memory. \$59.99. Digital Eclipse Software, 510/547-6101, 800/289-3374; fax 510/547-6104.

CD ROMS

Facelift Fonts

Make 'em big, make 'em smooth, with Volume One in the Pixel Presenter Series. The product is a collection of antialiased screen fonts. Fonts require a software package that can handle color text. Several typefaces provided, including Silver Bullets, a typeface of bullets, charting symbols, and dingbats. Product includes tutorials on screen and in the manual that show how to colorize characters and add type effects with gradient fills, drop shadows, and texture/pattern fills. \$149. ReMedia, 619/693-1448; no fax.

MacExclusives

Compilation of over 150 Mac shareware and freeware programs, most of which cannot appear on any other CD ROM disc, according to the company. Software is organized with on-disc Librarian, a navigational program containing compatibility reports, descriptions of all programs, and search features. Disc also includes more than 100 commercial demos. 3MB min. memory. \$49. ShareWare Authors, 504/838-0190, 800/879-1150; fax 504/837-0880.

Masterpiece Library

Disc of classic texts including works by Shakespeare, Milton, Hans Christian Andersen, Aesop, Poe, Chaucer, Twain, and Whitman. Also includes religious books, Confucius, and ancient Greek

authors. Indexing system searches by titles, words, and phrases. 2MB min. memory. \$39.95. Pacific HiTech, 801/278-2042, 800/765-8369; fax 801/278-2666.

Pro-100 #1

ISO-9660 format CD ROM contains 24-bit color imagery for use in video, 3-D graphic design, color slides, and print production. Textures include animal skins, marbles, plants, woods, metals, textiles, and others. TIFF, TARGA, PCX, and IFF formats included. \$199.95. Texture City Software, 310/836-9224; fax 213/656-9576.



Pro-100 #1

Svinga

Subtitled "A multimedia journey through Zimbabwe." A HyperCard database containing information on all aspects of Zimbabwe, including flora, fauna, geographical and historical information. Disc includes digitized voices; animal calls; excerpts from historically significant speeches; and 50 copyright-free 32-bit TIFF images for use by schools, travel agents, or desktop publishers. 2MB min.

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memory. \$149. Advanced Multimedia Company, 914/734-9171, 800/578-4860; fax 914/734-4053.

ACCESSORIES

Cable-Trap

If boardroom mice keep "walking away," this product will lock up to five input-device cables to a computer or work surface. Using exclusive bonding system, heavy-duty metal encasement mounts on desk or computer. \$24.95. Qualtec Data Products, 510/490-8911, 800/628-4413; fax 510/490-8471.

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Mouse Shadow

Mick Jagger said, "We all need someone we can lean on." The Mouse Shadow is a cushioned support that helps to keep the wrist straight during mouse use. The user's wrist rests on the pad, which rolls behind the mouse on three geoplast rubberized balls. \$14.99. Shadowtech International, 405/536-7108, 800/392-1402; fax 405/536-6201.



Mouse Shadow

Multi Media Disk Box

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Persona Micro

Persona Technologies, 415/871-6000; fax 415/871-6555.

BOOKS AND VIDEOS

The America Online Membership Kit & Tour Guide

Official handbook guides members through electronic-mail features, interactive forums, software files, computing support, online classes, news, stock quotes, and other information on America Online. Includes operating software and ten hours of free sign-on time. Written by Tom Lichty. 406 pages; \$34.95. Ventana Press, 919/942-0220; fax 919/942-1140.

Basics of Designing and Producing Newsletters with PageMaker

From the publishers of *ThePage* comes a book concentrating on the practical aspects of newsletter design. Includes a 16-page step-by-step guide to creating a newsletter prototype, converting the prototype into a template, and creating the first issue. 60 pgs. Written by David Doty. \$15 plus \$3 s/h (\$5 outside U.S.). PageWorks, 312/348-1200; fax 314/404-0717.

The Design Desktop Workbook

Reference guide and do-it-yourself workbook for desktop publishers helps users learn fundamental design, layout, production, and publishing concepts using a desktop publishing environment. In-

cludes over 350 illustrations, checklists, and sample forms, plus a 17-page glossary. Written by Don Busché and Bernice Glenn. 336 pages; \$27.95. Regents/Prentice Hall, 515/284-6751, 800/223-1360; fax 515/284-2607.

Macintosh and You: The Basics

Tutorial introduces Macintosh Finder interface and provides introductions to Works, Excel, PageMaker, Word, MacWrite, and Filemaker Pro. Written by Patricia Sullivan. 324 pages; \$18.95. Franklin, Beedle & Associates, 503/682-7668; fax 503/682-7638.

The Macintosh Multimedia Sourcebook

Lists more than 400 products for use on the Mac when producing or presenting multimedia applications. Listings include software, computer hardware, video and sound equipment and accessories, and CD ROMs and accessories. Edited by Trysh Brown-Freeborg. 72 pages; \$29.95 plus \$3 s/h. TBF Publications, 314/351-1729; fax 314/351-1729. **m**

To have your product considered for inclusion in *New Products*, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor, *Macworld*, 501 Second St., San Francisco, CA 94107. *Macworld* reserves the right to edit all product announcements.

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Questions and Tips from Macworld Readers

BY LON POOLE

WOULD YOU LIKE TO SEE text on screen in a larger size than it prints on paper? Don't bother fiddling with Microsoft Word's style sheets as suggested in last November's *Quick Tips*. Several readers suggest using two Word commands, Larger Font Size and Smaller Font Size, which are somewhat obscure because they are not normally on any menu. You can add them to a Word menu with the Commands command or you can simply use their keyboard equivalents. All you do is select the entire document (press ⌘-A in Word 5 or ⌘-option-M in Word 4) and press ⌘-shift- to enlarge text to the next larger standard size (for example, from 12-point to 14-point). Press ⌘-shift- again to increase to the next larger size. When you're ready to print, once more select the entire document and press ⌘-shift- enough times to bring the text down to the size you want for printing. The advantage of this method, as Jim Noble of McLean, Virginia, points out, is that it affects the entire document at once while maintaining the relative sizes of text throughout the document.

Another method works with Word and many other applications if you print to a LaserWriter or another printer that can reduce documents for printing. Saadya Sternberg of Chicago says the company where she works settled on 12-point Times as its standard, but quickly realized the screen versions were too difficult to read. The solution was to use the more readable 14-point Times, to set the margins and leading of the standard document proportionally higher with the Paragraph command (for example, 1.16 inches or 7 picas instead of 1 inch or 6 picas—the same 116 percent increase as the text size), and to set the Reduce or Enlarge option of the Page Setup command to 86 percent. Text prints at 12-point because 12 is 86 percent of 14, and margins are the correct size because 86 percent of 116 percent is 100 percent (14 is 116 percent of 12). Tab settings, other

paragraph formatting, and graphics must be increased by the same percentage as margins.

Stationery Awareness

Q One of System 7's more useful features is creating stationery (template files) by turning on the Stationery Pad option in a document's Get Info window. When I showed this feature to a co-worker, I expected we would see the dialog box that advises, "You have opened a stationery pad, so a new document will be created." Instead, Word 5 created a new document with the dumb default name "Untitled1." I guess Microsoft considers this an improvement over Word 4. I notice the same difference between Excel 4 and Excel 3. Can I change this behavior so that the dialog box appears before the file is opened? Is there a quicker way of setting the Stationery Pad option?

Bill Ellena
Lisle, Illinois

A According to Apple's guidelines for software developers, applications that know about stationery pads are supposed to do exactly what Word 5 and Excel 4 (and many other applications) do: open an untitled document with the format and contents of the stationery pad. For applications that don't know about stationery pads, such as Word 4, System 7 automatically creates a new document by making a copy of the stationery pad and displaying the dialog box you described. The dialog box contains a place for naming the copy. When you dismiss the dialog box, System 7 has the application open the copy of the stationery pad.

System 7 determines whether an application knows about stationery pads by inspecting a setting in one of the application's resources. You can use a resource-editing program such as Apple's ResEdit (available from APDA, 800/282-2732 in the United States,

800/637-0029 in Canada, 716/871-6555 in other countries) to change this setting so that System 7 handles stationery. Follow these steps:

1. Make a backup copy of the application, and then use ResEdit to open the copy.
2. Open the application's SIZE resource icon, and then open the SIZE resource whose ID is 0. If there is no SIZE 0 resource, open the SIZE -1 resource. (You probably won't find a SIZE 0 resource unless you have previously used the Finder's Get Info command to change the application's memory size.) A window opens showing the various settings in the SIZE resource.
3. Scroll until you see the setting "Stationery aware" and set it to 0 (see "Becoming Unaware"). This setting tells the system software to handle stationery for the application.
4. Quit ResEdit, answering Yes when asked if you want to save changes.
5. Drag the original application out of its folder and drag the modified application into the folder.

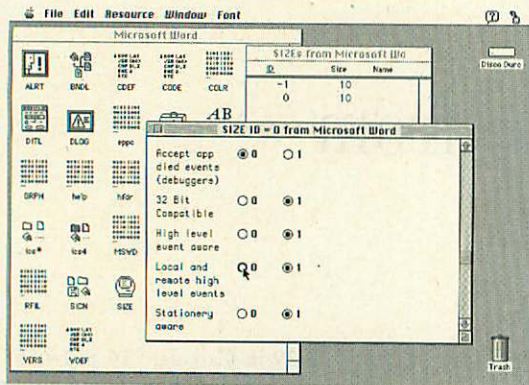
If you change your mind later and want the application to handle stationery instead of System 7, change the "Stationery aware" setting from 0 to 1 in step 3. Warning: If an application originally has a "Stationery aware" setting of 0, don't change it to 1. You can't make an application learn how to handle stationery simply by changing this setting; the application must be programmed to handle stationery as well.

Most applications that know about System 7's stationery let you save a document as a stationery pad, short-cutting the Get Info window. In Word 5, for example, you choose Stationery from the Save File as Type pop-up menu in the Save dialog box. You can also make any document a stationery pad with the

continues



*Hacking
Finder 7.1,
deter-
mining RAM
capacities,
and more*



Becoming Unaware Changing the "Stationery aware" setting in an application's SIZE 0 (or SIZE -1) resource makes System 7 handle stationery for that application as it would for an application that has no stationery capability.

shareware utility program Stationer by Robert Gibson (available from online services and from user groups such as BMUG, 510/849-9114).

Elusive PostScript Fonts

Q. The first time I printed a document with my new Mac LC II and HP DeskWriter C, using System 7 and Adobe Type Manager (ATM) 2.0, I was surprised at the poor appearance of Adobe PostScript fonts compared with Apple's TrueType fonts (no accident, I'm sure). The font quality was just fine with my old Mac Plus and HP DeskWriter using System 6.0.7 and ATM 2.0. My Adobe font collection is fairly substantial, so I hesitate to invest in TrueType. Is there a way for me to improve the print quality of the font collection I already have?

*Geoffrey Kind
Richmond, California*

A. Looking at the sample output you sent with your letter, I would say at least some of your PostScript fonts are in the wrong place. Your version of ATM expects to find them loose in your System Folder. But if you drag PostScript fonts to the System Folder's icon, Finder 7 puts them into a special folder inside the System Folder—the Extensions folder with Systems 7.0 and 7.0.1, or the Fonts folder with System 7.1. If you use the Installer program to update a disk from System 6 to System 7, PostScript fonts are likewise put into the Extensions folder or the Fonts folder (depending on the System version).

ATM 3.0 (the most recent version at this writing) knows to look in the Fonts folder, Extensions folder, or System Folder for PostScript fonts (depending on which system version you're using). Through a special offer sponsored by Apple and Adobe, anyone in the United States or Canada can get the latest version

of ATM plus four Adobe Garamond fonts for \$7.50 by calling 800/521-1976, ext. 4400. For other countries, an International English version (Adobe's term) of ATM is available for \$30 by calling 303/799-4000, ext. 4600.

Until you get an ATM upgrade, you can place your PostScript fonts loose in the System Folder, where your older ATM can find them. Just open your Extensions folder (or Fonts folder, if you have System 7.1) and drag your PostScript fonts into the System Folder window.

Memory Sizes

Q. A DOS user at work, I am learning to use an LC II 4/40. Repeated messages that the computer is out of memory have prompted me to investigate a memory increase. Can I upgrade the LC II to 8MB of RAM? The sources I've consulted, including the LC II manual, Apple's hotline, an Apple dealer, and a Macintosh reseller that advertises in *Macworld*, agree I can upgrade to 6MB or 10MB, but they disagree about 8MB.

*Phil Evans
Austin, Texas*

Decimal Precision

TIP When you use Word's Calculate command ($\mathbb{E}=\mathbb{E}$), the resulting amount matches the precision of the most precise number. For example, $4 + 8 + 16$ yields 28, whereas $4.0 + 8 + 16$ yields 28.0. This is particularly important for calculating dollar amounts and for dividing numbers. For example, $735/60$ rounds to 12, but $735.00/60$ yields 12.25.

*Neil Parker
Summerland, British Columbia*

continues

FINDER HACKS

Effect	Resource Type	ID	Where	Change to
Remove the icon-renaming delay	CODE	11	Offset A34	50C0 (from 5DC0)
Add a %~key equivalent for Make Alias	fmnu	1252	Offset 9E	M or any key not used for another Finder command
Add a %~key equivalent for Empty Trash	fmnu	1255	Offset 2C	T or any key not used for another Finder command
Add a %~key equivalent for Restart	fmnu	1255	Offset 7E	R or any key not used for another Finder command
Change the suffix for a new alias's name	STR#	20500	Item 1	One blank space, or any text up to 31 characters
Change the default name of a new folder	STR#	11250	Item 3	Any text up to 31 characters
Change the sample text displayed when you open a TrueType or fixed-size font	STR#	14516	Item 1	Any text
Disable animated zooming when opening and closing windows	CODE	4	Offset 78	6000 00E6 (from 48E7 1F38)
For a document whose creator application can't be found, specify which application to substitute (for example, TeachText opens text and PICT documents)	fmap	17010	Before the eight 0's at the end of the resource	Insert eight characters for each type of document: the document's four-character type code and the substitute application's four-character creator code

This table lists some of the more interesting modifications you can make to Finder version 7.1 with Apple's resource-editing program, ResEdit. Successfully performing any of these changes gains you membership in the Legion of MacHackers, which entitles you to wear a sweatshirt and dirty sneakers to work (consider additional articles of clothing, depending on local weather and ordinances) and to litter your work space with Styrofoam cups half-filled with week-old coffee.

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—PC/Computing
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—PC Magazine
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—The Washington Times
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June 1992

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—MacUser
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HOW TO/QUICK TIPS

Modifying Finder 7.1

TIP Bold Macintosh users who rushed to install System 7.1 have by now found that some of their favorite utilities for modifying the Finder don't work with Finder 7.1. System 7.1 has relocated some pieces of Finder code, which means that old utilities may have trouble finding the code they're trying to modify. For example, one resource that's been moved is the piece of code that controls the delay the Finder creates before letting you edit an icon name you've clicked. If you try to modify that delay with an old utility, you'll be out of luck. But if you're comfortable applying a minor ResEdit hack, you can remove the icon-editing delay in Finder 7.1 without using your old utility.

1. Open the System Folder and press the option key as you drag a copy of the Finder to the desktop. Open this duplicate Finder with ResEdit.

2. Open the Finder's CODE resource icon, then open the CODE resource whose ID is 11. You'll see a window showing the CODE resource's contents.

3. Find hexadecimal 5DC0 at offset A34, and replace it with 50C0.

4. Quit ResEdit, answering Yes when asked if you want to save changes.

5. Drag the original Finder from System Folder to the Trash, and drag the modified Finder from the desktop to the System Folder.

6. Restart the computer. Test your modification by clicking the name of an unlocked icon. The name should be highlighted immediately. When you're satisfied that your new, improved Finder performs satisfactorily, empty the Trash to remove the original unmodified Finder.

You can use similar ResEdit techniques to make other popular modifications to Finder 7.1 (see "Finder Hacks").

If in the future you wish to restore your Finder to its unmodified state, you'll find a pristine copy on the System 7.1 installation disk labeled Install 2.

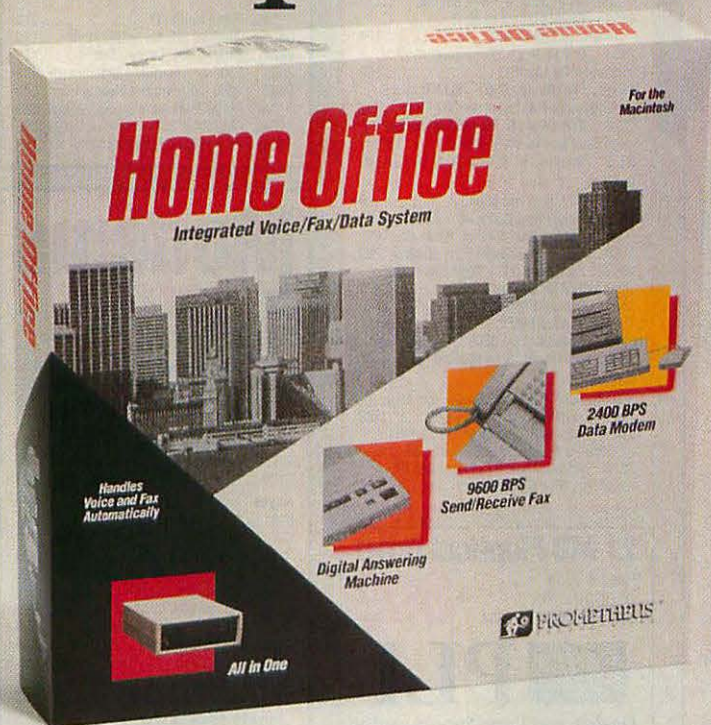
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LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld Guide to System 7.1* (IDG Books Worldwide, 1992).

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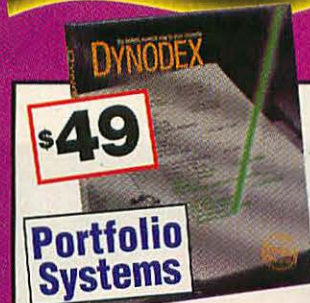
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Understanding File Formats

BY JIM HEID

REMEMBER THE VIDEOTAPE format wars of a few years ago—Beta versus VHS? You couldn't play one type of tape in the other type of machine, and until Beta finally died, video stores stocked both. Before that, the standards battle was between the 8-track tape and the audio-cassette. Earlier it was long-playing records versus fast-spinning 78s. And in the last century, railroads argued about how far apart the tracks should be. As the industry joke goes, the great thing about standards is that there are so many to choose from.

In the Macintosh world, this lack of standards hits home as you start using more and more application programs and need to move information between them. Maybe you want to include a scanned image in a document you've created with a publishing program. Or you want to move a database file created with Microsoft Works on a PowerBook to your desktop Mac, which is running FileMaker Pro. Or perhaps a client gave you a WordPerfect file, but you use Microsoft Word.

In each of these cases, you need to contend with *file formats*—the way a particular program stores information when you use the Save command. This month, I examine some of the technical issues behind exchanging data with disk files. I also show how to use the file-conversion features many popular programs provide, and I spotlight some programs that convert files from one format to another. "File-Conversion Guide" maps out the basic steps you must take to determine how to get "foreign" files into a format you and your Mac can understand.

The Format of Things

IDEALLY, YOU SHOULD BE ABLE TO USE one program to open another program's documents without thinking about file formats—just as you can play a compact disc using any brand of CD player.

The complex nature of applications makes this ideal world impossible, at least for now. Each category of program works with information in a different way, and each has its own information-storage requirements. A word processor needs to store long strings of text characters as well

as formatting information—fonts and type sizes, headers and footers, page numbers, margins. A spreadsheet program needs to store the numbers and formulas you've entered as well as column-width and text-formatting information. A publishing program must store formatted text and graphics as well as layout-related details such as the location of ruler guides. A database manager must store the data you entered and also the data entry screens and reports you designed.

You can see the common thread here: programs must store not only the text you type and the images you draw, but also the formatting codes necessary to re-create a document's appearance on screen and on the printed page.

A program's own file format is often called its *native* format. For example, Microsoft Word's native files are Word documents, while QuarkXPress's native files are QuarkXPress publications. A non-native file is often called a *foreign* file. To Word, for example, a WordPerfect document is a foreign file. The process of saving a file in a nonnative format is called *exporting*, while bringing data in from a different program is called *importing*.

Many programs are able to open and save files in competing programs' native formats. Among word processors, for example, Microsoft Word 5 can open and save WordPerfect documents, and vice versa. Among spreadsheet programs, Microsoft Excel can open and save Lotus 1-2-3 documents, and vice versa.

But there can be flies in the ointment. A document's formatting can change because one program might not support all the features of the other. Even worse things can happen: for example, if you use WordPerfect to open a Word file saved using Word's fast-save option, WordPerfect crashes. The solution: disable the option using the Open and Save option of Word's Preferences dialog box.

Filters for Files

MORE AND MORE SOFTWARE firms are creating programs

whose file-conversion features can be expanded through the use of conversion *filters*, also called *converters* or *translators*. A filter is a small file that tells a program how to convert a particular type of foreign file. Filters usually reside within a specific folder on your hard drive; when you start a program, it determines which filters are present and then adjusts its Open and Save dialog boxes to reflect those conversion options.

The filter approach has its advantages. You can save hard drive space by deleting unneeded filters or by not installing them to begin with. You can add additional filters as they become available; many developers make new filters available for downloading through online services such as America Online and CompuServe. (For details on downloading software from online services, see "Getting Started with Downloading Freeware and Shareware," *Macworld*, December 1992.)

Just a few of the programs that use conversion filters include Microsoft Word, Aldus PageMaker, QuarkXPress, WordPerfect, T/Maker's WriteNow, and Claris's MacDraw Pro, ClarisWorks, and MacWrite II. The last five programs use a file-translation technology called XTND. Originally developed by Claris and now under Apple's wing, XTND es-

tablishes a standard design for filters, so that any filter designed for XTND can be used with any program that supports XTND. This standardization also makes it possible for companies to sell libraries of file translators that work with any XTND-compatible program. DataViz's MacLink Plus/Translators is one such package, offering over 150 translators.

How to Convert Foreign Files

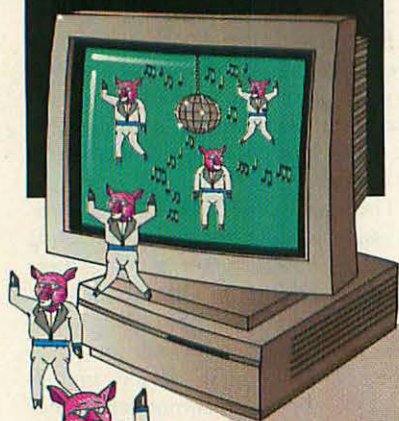
SO HOW DO YOU DETERMINE whether Program A can import Program B's documents? Start by checking Program A's manual—it probably has a chapter or appendix on exchanging files with other programs. If you don't have the

continues



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manual or you can't bring yourself to read it, there are two techniques you can try.

- **Drag and drop.** This technique works with System 7 only. Simply drag the document's icon to the icon of the application program. If the program is able to open the document, the program's icon becomes highlighted (see "Opening Foreign Files"). Release the mouse button while the program's icon is highlighted, and the Mac starts or switches to the program, which then automatically opens the document.

- **Use the program's Open command.** Because the Finder doesn't know which import filters you have installed, this technique is more reliable than the previous one. Start the program you want to use to open the document, choose Open from the File menu, and then navigate your way to the folder containing the document. If the program is able to open the document, its name will appear in the Open dialog box. (In many programs, you can narrow down the list of files displayed by choosing the type of file you're looking for from a pop-up menu in the Open dialog box.) When you double-click on the document, you'll probably see a message saying the program is converting a foreign file.

When a program imports a file, that file's contents usually appear in a new, untitled window. If you choose the Save command, you'll need to supply a name for the document. Don't type the same name as the original foreign file unless you really want to replace it. It's better to use a different name, one that reflects the fact that you've converted the file. For instance, if you used Word to open a foreign file named Business Plan, you might name the new file Business Plan/Word.

Desktop publishing programs put a different spin on the import-export routine. In Aldus PageMaker, instead of using the Open command to import a document, you use the Place command. In

QuarkXPress, you use the Get Text or Get Picture command. With both programs, an imported file doesn't appear in a new, untitled window, but in the currently active publication window. Both PageMaker and QuarkXPress include filters for a large variety of file formats—any publishing program must, since one of its chief roles is to allow you to combine text and graphics created in other programs.

Interchange Formats: Common Ground

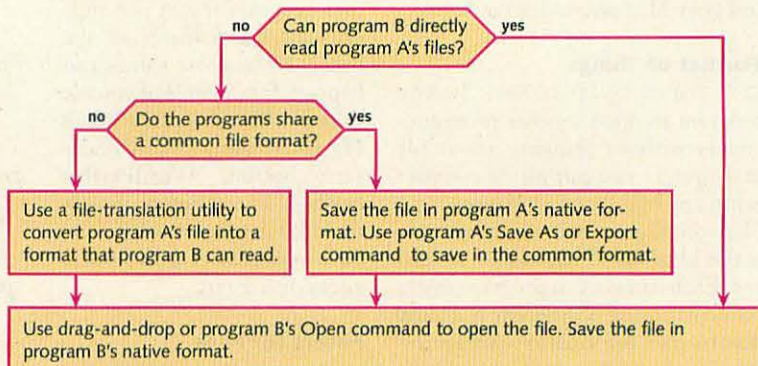
IF ONE PROGRAM CAN'T DIRECTLY READ another program's documents, you need to find a file format that both programs do support. This parcel of common ground is often an *interchange* file format—a file format designed for moving data between programs.

For word processor documents, the best interchange file format is the *rich-text format*, or *RTF*. Developed by Microsoft, this format is supported by Word and a number of other programs, including WriteNow, WordPerfect, and Aldus PageMaker. RTF files retain all text formatting and graphics. The least desirable interchange format is *text-only*, which discards nearly all formatting information.

For spreadsheets and databases, a common interchange format is the *symbolic link*, or *SYLK*, file. If you save a spreadsheet as a SYLK file, you'll lose font, style, and size information, but you will save rudimentary formatting such as column widths and cell alignment. All popular spreadsheet and database programs can open and save SYLK files. You can also exchange databases through text-only files, although you'll lose all formatting. (See last month's *Getting Started* for details on creating text-only files using a database manager.)

For graphics, you can choose from a variety of interchange formats. For bit-
continues

File-Conversion Guide



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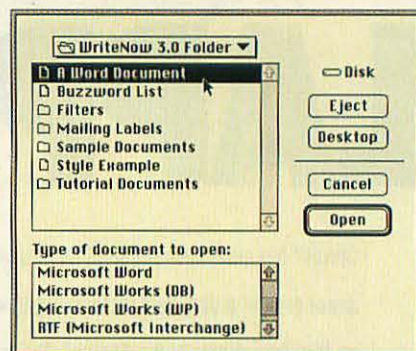
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Converting from "A Word Document". To cancel conversion hold down the ⌘ key and type period (.).

Opening Foreign Files If you use System 7, one way to open a foreign file is to drag its icon to the icon of the program. When the program's icon highlights (top), release the mouse button. Here, a Word document is being dragged to the icon of T/Maker's WriteNow. A better technique is to start the program and then choose its Open command (middle). When you open a foreign file, most programs display a conversion dialog box similar to this one (bottom).

mapped graphics such as scanned images, you will probably want to use the *tagged-image file format*, or *TIFF*. For object-oriented graphics such as illustrations created with MacDraw, the *PICT* format is a good choice (for color images, use the *PICT2* format). For PostScript illustrations created by programs such as Aldus FreeHand and Adobe Illustrator, use the *encapsulated PostScript*, or *EPS*, format. Each of these formats is supported by major graphics programs as well as desktop publishing software and even many word processors, including Microsoft Word and WordPerfect.

Some programs' native file formats are so widely supported that they can serve as interchange formats. For example, every Mac word processor I know of can open and save MacWrite documents. If you need to transfer files between two programs that can't read each other's files but do support the MacWrite format, you can use this format as a middleman.

Before exporting a document from a given program, first save it in the program's native format—in case you have to edit the original later. To save the document in a foreign format in most programs, you use the Save As command and then choose the desired format from a

continues

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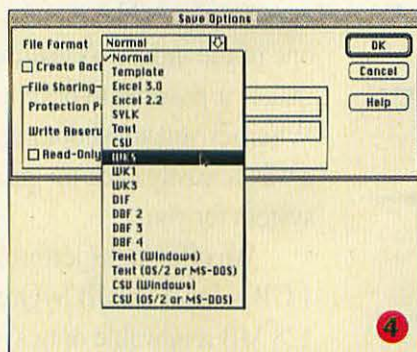
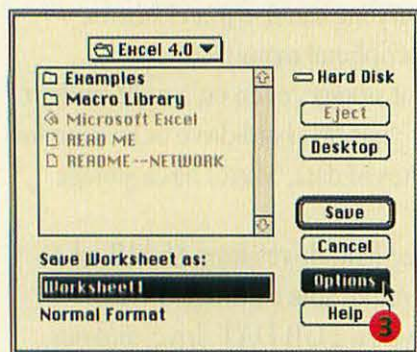
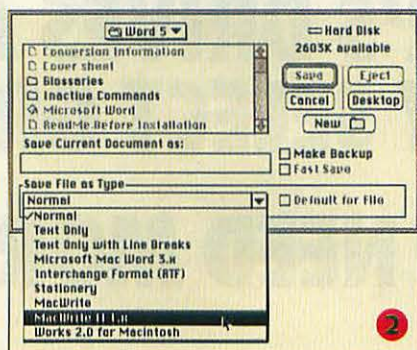
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Pick a Format The key to saving documents in foreign formats is usually the Save As command. Typically, a program—such as WriteNow (1) or Microsoft Word (2)—lists recognizable file formats in its Save As dialog box. An exception is Microsoft Excel; to select a different format, you must click on the Options button in the Save As dialog box (3) and then choose from the File Format pull-down menu (4) that subsequently appears.

pop-up menu or button list (see “Pick a Format”). Some programs, including Claris FileMaker Pro, provide an Export command instead. Aldus PageMaker and QuarkXPress provide Export commands for exporting text from a publication. You might use their Export commands if you want to create a word processor file containing some or all of a publication’s text.

Translator Utilities: Data Bridges

IF TWO PROGRAMS DON’T SHARE A common file format, there’s still hope—a translation utility such as the MacLink Plus series (Dataviz, 203/268-0030) or DeBabelizer (Equilibrium, 415/332-4343). These programs bridge the gap between disparate programs by enabling you to convert files of one format into

another format. The MacLink Plus series includes MacLink Plus/Translators, that package of XTND filters mentioned earlier; and MacLink Plus/PC, for swapping files between Macs and IBM PCs and their clones. MacLink Plus’s translators support all popular file formats for word processors, spreadsheets, databases, and graphics programs. DeBabelizer handles graphics formats only.

Translation utilities such as MacLink Plus/PC can be especially valuable if the gap you’re bridging is between Macs and PCs. MacLink Plus/PC version 7.02 includes Apple’s PC Exchange extension, which allows you to insert PC disks in a Mac’s floppy drive and work with them as you normally would. PC Exchange requires a SuperDrive floppy drive, which is built into all Macs made after August 1989 (except for the PowerBook 100 and the Duo models, which lack floppy drives). SuperDrive upgrades are available for most older Macs. For more details on Mac-PC file swapping, see “Bridging Two Worlds,” *Macworld*, March 1992.

MacLink Plus/PC also includes Apple’s new Easy Open extension, which helps put an end to those annoying error messages that say a document can’t be opened “because the application program that created it could not be found.” When you double-click on a document that normally couldn’t be opened because its creator is missing, Easy Open steps in and searches for programs and translation utilities that are capable of opening the document, and then lists them for you. Once you select an alternate program, *continues*

From Extensions to Signatures

A Macintosh document contains special codes—collectively called a *signature*—that identify the application in which it was created. The signature allows you to open a document by double-clicking on its icon. When you do, the Mac consults the document’s signature to determine which program to start. If you don’t have that program, a message appears saying the document “could not be opened, because the application program that created it could not be found.”

Application programs also use signatures to narrow down the list of files in their Open dialog boxes. When you choose a program’s Open command, its Open dialog box shows only those documents the program knows how to open. That’s because the program checks the signature of every file, and displays only those files whose signatures—and therefore, whose formats—it recognizes. This often confuses newcomers, who wonder why a document they can see when using the Finder doesn’t show up when they switch to a program and choose the Open command.

A document’s signature has two components: a *creator* code and a *type* code. The creator code identifies the program that created the document; this is the part of the signature the Mac uses when you double-click on a document to open it. The type code identifies what kind of document it is—a Word document, a PageMaker document, and so on. A

program uses the type code to determine which files to display in its Open dialog box.

The type and creator signatures are four-character codes; for example, a Word document has a type code of WDBN and creator code of MSWD. Both codes are stored within a document; you can’t see them by opening the document or by looking at its icon. However, you can examine and even change a document’s type or creator code using a utility such as Apple’s ResEdit. Changing a signature doesn’t change a file’s internal format, but it can still be useful. For instance, if a colleague gives you a TIFF image on a DOS disk, you must change the file’s type code to TIFF before it can appear in a Mac graphics program’s Open dialog box. That’s because a PC file normally has TEXT as its type code—causing most Mac graphics programs to see it as a text-only file rather than a graphics file.

Utilities such as Dataviz’s MacLink Plus, Apple’s PC Exchange, and Dayna’s DOS Mounter give PC files signatures that enable you to open them by double-clicking. They do this by associating a specific Mac signature with a specific PC file extension—a three-character suffix that appears after a PC file’s name. For example, when you double-click on a PC document’s icon whose name ends with DOC—the extension used by the PC version of Microsoft Word—PC Exchange tells the Mac to start Word.

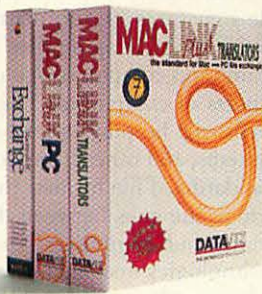


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Macintosh PC Exchange makes DOS disks appear on the Mac desktop and shows their contents as Macintosh files and folders. New Macintosh Easy Open is a System 7™ extension that helps you open Mac or PC files when the application that created them isn't on your Mac. These technologies from Apple teamed with our translators offer the most complete solution to file transfer and translation available in a single package.

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In addition to providing you with transfer capability, MacLinkPlus also translates files transferred via other methods. Such as disk mounting utilities like DOS Mounter and AccessPC, MS-DOS emulators such as SoftPC, and network software such as NetWare and LANtastic. Let MacLinkPlus do the work of converting foreign files transferred with these products into the exact format you need. MacLinkPlus/Translators contains the full translator library, Macintosh PC Exchange and Macintosh Easy Open. While MacLinkPlus/PC has all of these, it also allows you to connect a Mac and PC with the included serial cable or via modems.

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Easy Open converts the document by using that program's built-in translation capabilities or by using a translation utility you've previously installed.

If you use PC media other than 3½-inch floppy disks, investigate Dayna Communications' DaynaFile II (801/531-0060) series of disk drives (which can handle 5¼-inch DOS PC floppies) and DOS Mounter software (which is similar to Apple's PC Exchange but supports a wider array of media, including SyQuest and Bernoulli removable-cartridge drives). DOS Mounter and PC Exchange also help the Mac's Finder determine which program to open when you double-click on a PC file's icon. For a look at how they accomplish this, see "From Extensions to Signatures."

Avoiding Formatting Foibles

WHEN YOU'RE MOVING FILES BETWEEN two computers—whether Macs or DOS PCs—you may encounter formatting problems if both machines don't have the same fonts. If you open a document that uses fonts you don't have on your system, you're likely to see a lot of oddly spaced text in the Courier font.

One solution to this problem is to make sure your Mac contains all the fonts used in the original document. Another solution is to use SuperATM (Adobe, 415/961-4400), a new-and-improved version of the legendary Adobe Type Manager utility, which uses PostScript fonts to let the Mac display smooth-looking text at any point size. SuperATM does this, too, but it also automatically generates substitute fonts whose widths match those of missing ones. The resulting document won't look exactly like the original, but at least its line endings and overall formatting will be the same.

Having to contend with file formats, file signatures, and formatting problems can make exchanging files between programs and computers one of the trickier aspects of computing. The process may eventually become easier—Apple, Adobe Systems, and other firms are working on standardized file formats that promise to bridge the gaps between disparate programs and computers. But until these technologies become available and reliable, your best strategy is to standardize on programs that support one another's file formats. And be sure to keep a file-translation utility handy just in case those standards fail you. **m**

Contributing editor JIM HEID looks at a different aspect of Mac fundamentals each month. He covers System 7 and 7.1 in his latest book, the second edition of *Inside the Apple Macintosh* (Brady, 1992), which he coauthored with Peter Norton.

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PowerBook

Notes

Tips for Fast Faxing and Data Transfer on the Road

MODEMS, THE MOST POPULAR POWERBOOK hardware accessory, forge a nearly essential link to the outside world. Every modem sold for a PowerBook plays two distinct roles. The data-communications side supports E-mail, file transfers, and remote networking. The fax side turns a distant fax machine into a remote printer.

When you're deciding which data/fax modem to buy for a PowerBook, start with the question "Internal or external?" (If you don't know much about data communications, start with "How to Buy a Modem," *Macworld*, August 1992.)

External modems have the obvious advantage that they can be rotated among other computers—other PowerBooks or desktop Macs, even IBM PCs. Avoid 2400-bps portable external modems that draw power from the serial port (such as those from Hayes and Practical Peripherals). These modems are designed for PC-compatible laptops, which, unlike PowerBooks, supply power through their serial ports. Nearly all 9600-bps and 14.4-Kbps external modems work with PowerBooks because the faster modems have their own power supplies, but be sure to get a hardware handshaking cable. (Before you buy, it's a good idea to double-check that the modem comes with the Mac cables, software, and AppleTalk Remote Access script that you'll need.)

Internal modems fit inside the computer and contain processing circuits that manage the modem with minimal demands on the PowerBook's CPU. The big differences among the non-Apple internal data/fax modems are speed and software. When pressed, modem manufacturers concede that the hardware differences, if any, are minimal.

If you already have a modem for your desktop Mac, get a similar one for your PowerBook. Compatible modems with identical supporting software can share



PHOTO BY PAUL FRANTZ-MOORE/SCREEN IMAGE BY JIM LUDTKE

setup parameters and fax phone number lists, which is a real convenience.

Apple's Express modems for recent PowerBooks retail for lower prices than competing internal modems. The two Express models, one for the PowerBook 160, 165c, and 180 and a second for the Duos (thus far the only modem that fits inside this PowerBook), have a simplified design that relies on the PowerBook's CPU to manage transmissions.

If you happen onto older equipment, keep in mind that although most recently made fax modems receive and send faxes, not all early models can. For instance, the original Apple Data/Fax modem (2400-bps-data/9600-bps-fax) can't receive faxes.

Foreign Travel

MODEM MODULATION SCHEMES (FOR 2400 bps and up) and the tone-dialing codes are international, but pulse dialing and call-progress detection—dial tones, ringing, busy signals—vary from country

to country (sometimes small adjustments to the signal level will improve the connection). And many countries have intricate regulations for equipment attached to a telephone line.

There are three ways to deal with modem operation in foreign countries.

- Use a modem designed for operation in North America. You may run into some operational glitches, but the modem should work most of the time. (One exception is Apple's original PowerBook fax modem, which can cause problems for users in Japan.) You'll definitely violate telecommunications regulations in many countries; you may not care.

- Get a modem designed for international operation. Several companies, such as Global Village and PSI, make PowerBook modems with non-volatile RAM that stores configuration parameters for several countries that you can select through software. The international model may be distinct from a North American version, although modem makers are moving toward worldwide models. This strategy solves many operational glitches but doesn't necessarily meet regulatory requirements. Some countries are so restrictive as to prohibit software-reconfigurable modems.

With these two alternatives, you will need a cable adapter for many countries. Teleadapt in Great Britain (29A Bridge St., Pinner, Middlesex HA5 3HR, England; 44(0)81 429 0479, fax 44(0)81 868 1697) offers 35 cable adapters for about £15 each. A kit of 10 adapters for European Community countries costs £100.

- Get an Apple modem. To create a modem that meets all countries' regulations, Apple plans to split the international version of its Express modem into two parts: a board that goes inside the PowerBook plus a small external hard-

continues

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ware add-on called a DAA (Data Access Arrangement). About the size of a pack of gum, the DAA will connect the PowerBook and the phone line. Apple plans to produce different DAAs for about 15 countries. According to Apple, you won't be able to get a set of DAAs before a trip; you'll have to buy one locally in each country. DAA pricing wasn't set at the time of this writing but was expected to be under \$100 each. The DAAs will be compatible only with the international Apple Express modem, not with the Express modem sold for use in North America, and Apple has not yet decided whether to make a North American DAA. Thus an international traveler might have to swap modems when traveling to and from North America, besides having to collect the necessary DAAs for other countries. This is a mess, but so are international telecommunications regulations.

Getting Up to Speed

ONCE YOU KNOW WHETHER YOU NEED an internal, external, or Apple Express modem, the big question is what speed. The simple answer is buy the fastest modem you can afford.

On the fax side, 9600 bps is fast enough because there are very few fax machines out there that can receive any faster than that. Some data/fax modems, including APS's budget model, send at 9600 bps but receive at 4800 bps. If you prefer to receive faxes by modem only as a last resort because they're hard to read on screen, that wouldn't be much of a disadvantage. If you mostly need fax, an internal 2400-bps-data/9600-bps-fax model should do fine, and prices start at only \$69 (from APS Technologies, 816/373-5800, 800/235-2752).

For heavy data use, though, buy a modem that handles data transfer at 14.4 Kbps; such modems cost only about \$60 more than the ones with a top data speed of 9600 bps. If you ever use AppleTalk Remote Access (ARA) to dial into an AppleTalk network through phone lines, it's worth spending the extra dollars. A low-cost modem that exchanges data at 2400 bps suffices for tasks like picking up E-mail and linking to online services, but the additional time and telephone charges you run up with a slow modem offset any initial savings.

Watch out for one common, misleading marketing practice. Some modem makers claim that their 2400-bps modems operate at 9600 bps (or that their 14.4-Kbps modems operate at 57.6 Kbps), a four-times speed improvement that the modems can *theoretically* achieve through

V.42bis data compression. Practically, though, this compression usually only doubles the speed. So if the price of a "9600-bps" modem seems too good to be true, it's probably a 2400-bps modem using compression.

Piling On the Extras

BEYOND THE HARDWARE SPECS, LOOK at the companion software and any special features. The basic fax software that comes with most data/fax modems is just that: basic. It's incredible that I couldn't find one package that could do something as simple as accessing a fax number from a FileMaker database and then sending a message. Maybe next year. PostScript fax software, which sends a crisp PostScript image to compatible fax machines (and a standard fax to others) is unlikely to be available soon for individual fax modems.

On the other hand, you'll soon be able to buy modems, such as the \$349.95 SupraFAXModem 144PB from Supra Corporation (503/967-2400), that offer Caller ID decoding. If Caller ID is offered in your area, the phone number of a caller appears on screen every time you receive a call. In a modem, Caller ID could trigger a database search and display of the name of the calling party. Such a feature might also help limit modem access to authorized parties.

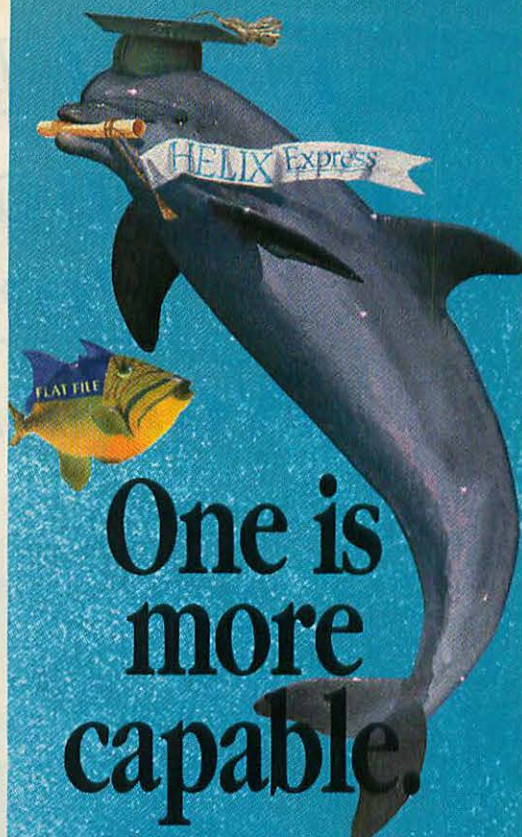
Applied Engineering (214/241-6060, 800/554-6227) has shipped the first PowerBook modem with voice processing, the \$525 DataLink PB. This modem and the \$399 Ultima Home Office modem announced by Prometheus Products (503/692-9600) can digitize telephone conversations for storage on a PowerBook's hard drive. They can act as answering machines while you travel so you can get messages in your hotel room, for example. (But would you leave a PowerBook unattended in a hotel room?)

The DataLink PB goes further than the Ultima by turning the PowerBook into a speakerphone, using the PowerBook's built-in speaker and Apple's microphone (built-in or external). The DataLink makes a pretty good speakerphone, especially if you hold an external microphone close to your mouth. Unfortunately, the DataLink PB is unusually difficult to install; it requires soldering to the system board.

Hitting the Road

ANY MODEM CAN BE CONNECTED TO a cellular phone that has a data port, using

continues



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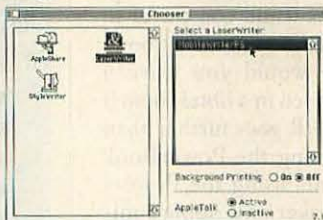
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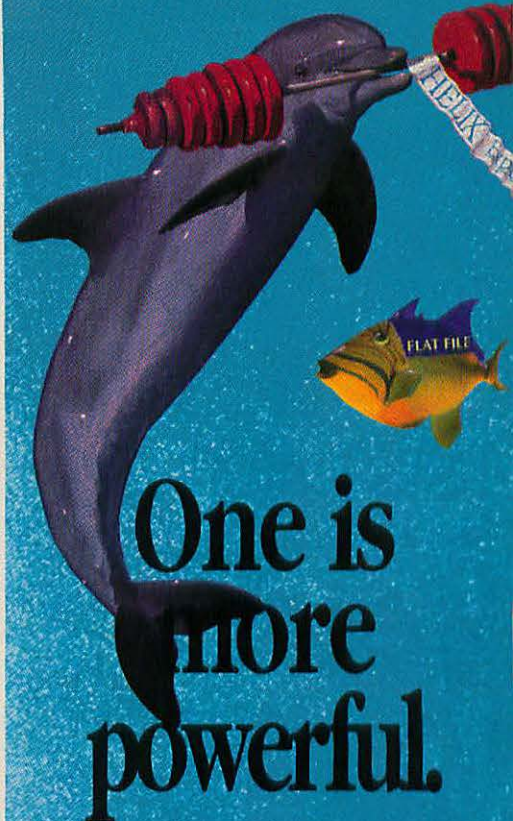
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The Top 16 Modem Tricks

1. Make sure that the Apple Communications Toolbox extensions (such as Apple Modem Tool and Apple Serial Tool) that come with your communications software are up-to-date (version 1.1.1 at this writing), because earlier versions don't work as reliably. Obtain updates from AppleLink (in the Software Sampler) or through Apple Customer Assistance at 800/776-2333.
2. Whenever possible use the Zmodem protocol, which is much more efficient than the Xmodem protocol designed in 1977 for local phone links at 1200 bps. Like all such protocols, Zmodem must be installed on both ends of the link. If your communications program doesn't have Zmodem, there's a Zmodem protocol in the File Transfer Tool Bundle, \$69.95 from Sequest Software (503/531-0252), that works with any program that uses the Apple Communications Toolbox; the bundle also supports Ymodem and Kermit.
3. Some modems don't allow enough time to negotiate speed, error correction, and data compression when attempting to connect with the modem at the other end of the line—instead they drop the line. Sometimes you can fix matters by turning off error correction at your end. (For the Apple PowerBook modem, insert `&Q0`—ampersand, letter Q, number zero—in the modem string; `AT&Q0TD`).
4. Apple's Data/Fax modem can't send a break signal, so if you connect to a host computer that requires one, try a different modem.
5. PowerBooks won't go to sleep if an internal modem is set for autoanswer.
6. To save battery power, always turn off modems and close communications programs when they aren't in use.
7. Some office phone systems produce dial tones the modem can't recognize. If that's the case, the modem won't dial. Try putting in a comma as the first character of a phone number; the comma is treated as a pause and some software will dial everything after the comma whether there's a dial tone or not.
8. If you have an internal modem and connect some other device to the modem serial port, keep in mind that operating the internal modem deactivates the modem port—you can't run the other device at the same time.
9. When you use an external modem, select External Modem in the PowerBook control panel. If you have a PowerBook 100, connect an external modem to the Printer serial port and deactivate AppleTalk in the Chooser.
10. Fax modems fail to connect to about 5 percent of standard Group III fax machines. If you notice trouble with a machine, record the brand and model number and the type of trouble. Sometimes the fax modem company offers software or ROM fixes that let you connect with nonstandard fax machines.
11. Make sure your hard drive is up and running before you fax; otherwise the machine on the other end might get tired of waiting and hang up.
12. To save time and money, choose the lower fax resolution (called *standard*, or *faster*) whenever the image quality doesn't matter. Also avoid faxing images that use patterns of alternating black and white pixels to simulate gray areas—they confound the automatic fax compression and thus slow down transmission.
13. For the fastest fax transmission with brief messages, shorten the page length in your application's page setup menu. But don't make it so short that it gets lost in the fax basket at the receiving end on fax machines that use rolls of paper—the majority of machines.
14. Skip the fax cover sheet and instead put a bold header on the first page to identify sender and recipient.
15. If you don't have time to wait for a busy fax line to clear, you can send text-only faxes through an electronic-mail service such as MCI Mail, which can inexpensively make multiple attempts to deliver. Or send it to a fax-forwarding service (like the ones offered by many phone companies). If your desktop computer and modem are equipped with new DTMF (dial tone multifrequency) software, which lets you dial in and issue commands with telephone tones, you can send the fax to your desk and have it relayed from there.
16. Remember that you can't edit the faxes you receive. Some companies bundle OCR software with their fax modems, but OCR isn't perfectly reliable. If the document you want is a computer file to start with, you're better off having it sent as a data file so you won't have to rekey and proofread.

continues



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a hardware interface box such as Axcell from Applied Engineering. The Axcell box connects the modem and specific cellular phone models that can accept an external signal; the price is \$299 to \$399, depending on the phone model. The sometimes erratic performance of cellular calls makes error correction essential. The standard V.42 error protocol works, but a protocol (such as MNP 10) designed specifically for radio links works best. Applied Engineering's DataLink PB is the first PowerBook modem to include MNP 10. Like other protocols, MNP 10 must operate at both ends of the link, but very few desktop modems now include it.

Plugging In

ALL THE MODEMS DESCRIBED THUS FAR connect electrically to the phone line through the RJ-11 modular phone jack that's a standard throughout North America. For an older, four-prong jack, use an adapter (Radio Shack #279-351). If the phone has no jack and you know what you're doing, you can disassemble either the phone or the wall box and connect directly to the phone-line wire pair, generally red and green wires. The Radio Shack #279-391 cable has spade lugs at one end (cut off the black and yellow wires) and a male RJ-11 plug at the other; use an RJ-11 coupler (Radio Shack #279-358) to get a standard female RJ-11 jack. Please don't get into the wiring unless you're experienced. You can damage equipment easily. Phone lines can

produce a shock, although they are not as dangerous as power lines. And if the phone equipment isn't yours, respect the owner's wishes about disassembly.

If you are dealing with a PBX system that will not accept a modem connection directly, you may be able to connect at the handset plug with the \$149 Konexx coupler from Unlimited Systems (619/277-3300). It will work with many digital PBX systems, although you might have to dial manually, and autoanswering often won't work. If you don't have a Konexx coupler, connect to the fax phone lines.

If you can't get at the wires, you can use an acoustic modem, which has a small speaker and microphone to fasten to the handset. Handsets in old telephones may need some shaking or repositioning to work. With luck, a \$149 Unlimited acoustic coupler can achieve 9600 bps. Unlimited also offers a complete \$290 portable acoustic modem that runs on a 9-volt battery (2400 bps for data, 9600 bps for fax).

When you make hotel reservations, look for hotels with free local calling and fair long-distance charges. Also ask whether rooms have plug-in phone jacks or second lines so you can talk on the phone while your modem transmits. Who knows—if enough of us ask, we might more often see the electronic accommodations we need along with basic hotel furnishings. **m**

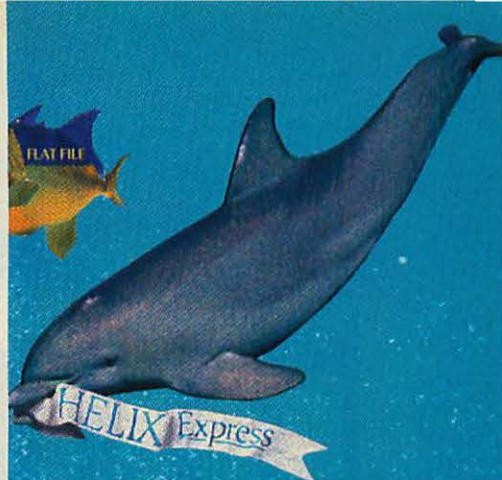
CARY LU got his first Mac in the summer of 1983. He is the author of *The Apple Macintosh Book* (Microsoft Press, 1992).

More on Hidden Storage

In my *PowerBook Notes* column of February 1993, I explained how to unlock the hidden storage of Macintosh hard drives by changing the partition size. Here are some additional cautions:

- If your PowerBook has an Apple 120MB drive, *do not* change its partition size because you'll risk corrupting the System Folder. If you have already repartitioned such a drive, back it up and reinitialize it with Apple HD SC Setup to restore the default partition.
- Always back up a hard drive, and make sure the backup files are functional, before partitioning or making other major adjustments to the drive, because repartitioning often wipes the hard drive clean, destroying all the data.
- If the size of your hard drive remains the same or gets smaller after repartitioning, it's probably due to a mistake. Try again, scrupulously following the instructions in the February column. Don't reinitialize after a partition change.

Finally, I apologize to anyone who ran into difficulty trying to follow my instructions. Many users and Apple engineers confirm that the procedure is appropriate, except in the case of the PowerBook 120MB drive. Contrary to some rumors, the hidden storage is not set aside to fill in if other parts of the drive develop defects; it is simply unused space. Users should keep in mind the time that may be needed to restore files in deciding whether to use this procedure.

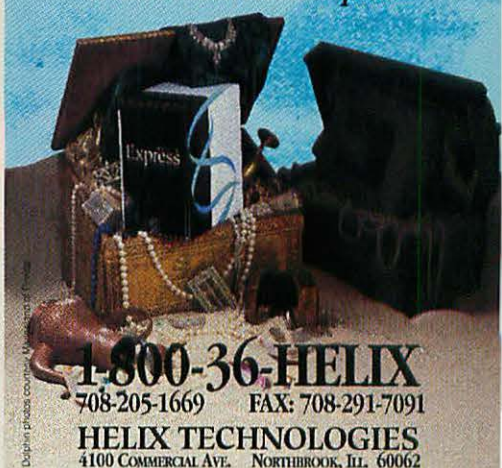


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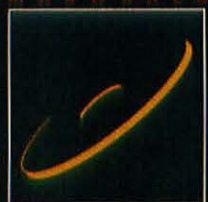
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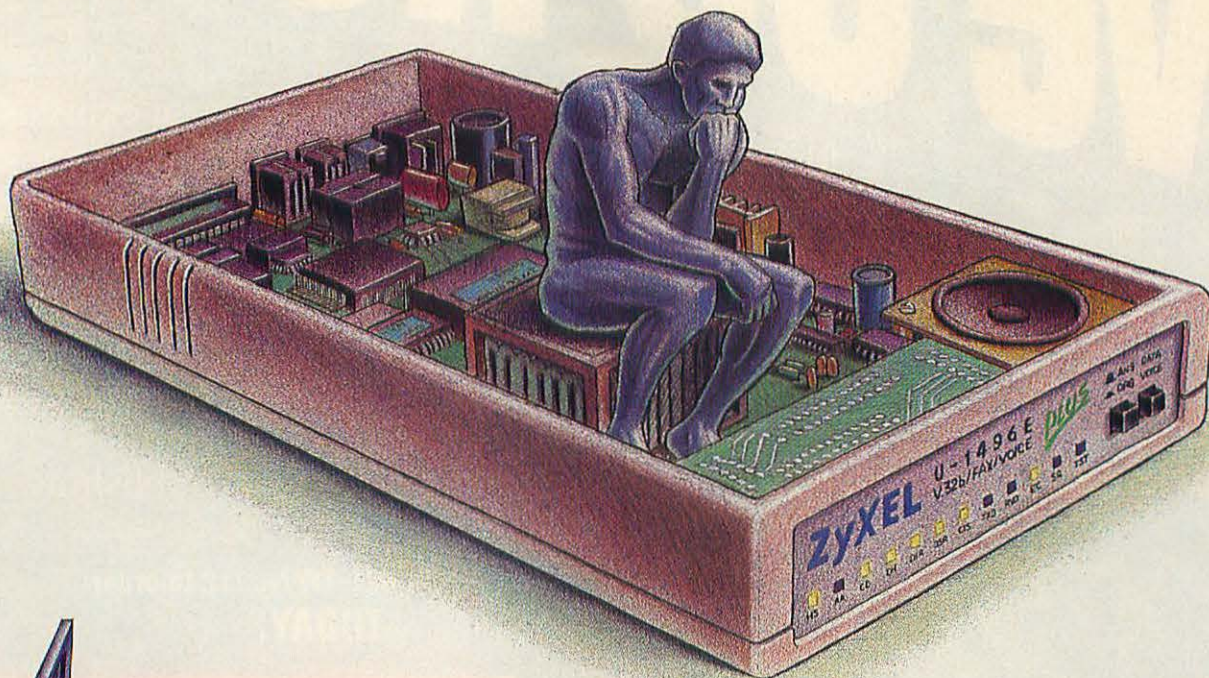
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★★★★ **Components 1.0**, *Satori Software*, 206/443-0765, \$795 per module. Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is not without its bugs and flaws. Sep 92

☐ **Great Plains Accounting 6.0 (6.1)**, *Great Plains Software*, 701/281-0550, \$795. High-end bookkeeping software offers a first-rate lineup of dedicated modules. Different individuals or groups can easily use the various accounting functions.

★★ **HyperTax Tutor 1991**, *SoftStream International*, 508/991-4011, \$99. If you're willing to put up with a design that's neither intuitive nor easy to use, this cross-referenced book contains extensive explanations, strategies, and examples of complex IRS tax laws. Apr 92

★★★ **Job Cost/Time Billing 1.05**, *Satori Software*, 206/443-0765, \$1495. Professional billing software incorporates high-end job-cost and accounts-receivable features in one module, plus an excellent report function; but confusing elements, minor bugs, and inaccuracies in the documentation are weaknesses. Aug 92

★★★ **MacInTax 1992**, *ChipSoft*, 619/453-8722, \$79.95. It's difficult to correct your errors when using this personal tax-preparation software, but it's definitely easier than doing your taxes by hand. The display is attractive, the program supports electronic filing, and there are 15 state-tax versions available. May 93

★★★★ **Managing Your Money 5.0**, *MECA Software*, 203/256-5000, \$79.95. An already strong financial-management program becomes easier to use and slightly more powerful with this upgrade. Jan 93

☐ **MYOB 3.0**, *Teleware*, 201/586-2200, \$199. A file-cabinet metaphor makes the interface of this accounting package easy to use and understand. For an accounting system with one user who has no need for payroll capabilities, it's the best choice.

☐ **Quicken 3.0**, *Intuit*, 415/852-9696, \$69.95. Track assets, liabilities, income, and expenses with this personal-finance package. It has a good Mac interface and is easy to learn and use.

★★★★ **Timeslips III 2.1**, *Timeslips Corp.*, 508/768-6100, \$299.95. Complexity is the price you pay for this time-billing utility's impressive flexibility. Fortunately, thorough documentation, excellent tech support, and default settings help any user get started. Sep 92

BUSINESS TOOLS

★★★★ **4th Dimension 3.0.1**, *ACI US*, 408/252-4444, \$895. Multitasking, which greatly improves speed in a carefully designed application, makes this upgraded relational database delightful for both developers and end users. For a relational database, it's impressively easy to use. Apr 93

★★★ **Aspects 1.01 (1.03)**, *Group Technologies*, 703/528-1555, \$285 to \$1295. Collaborative software allows up to 16 people to edit a project. Controlled access as well as individual and linked views are good features, but the lack of outlining and spreadsheet modules limits its usefulness. Jun 92

★★★★ **Atlas Pro 1.0.6 (1.5)**, *Strategic Mapping*, 408/985-7400, \$795. Although this mapping software is not a complete geographic-information system, it boasts a rich feature set and a competitive price. Nov 92

★★★ **Bar Code Pro 1.0**, *Synex*, 718/499-6293, \$450. Easy-to-use desk accessory creates bar codes in EPS or PICT for use in desktop publishing or labeling programs. It does well what it sets out to do, but lacks automatic sequential coding and fails to catch invalid characters. Sep 92

☐ **Claris Resolve**, *Claris Corp.*, 408/727-8227, \$249. Advanced features come within easy reach of spreadsheet pedestrians with this program. Anyone can learn how to use it in 10 minutes and how to customize it in 20.

★★★★ **DataPivot 1.02 (1.1)**, *Brio Tech-*

nology, 415/961-4110, \$299. Convenient and flexible report-generator includes fast formatting, automatic import, and just about every other item on the wish list of users who need report tables that emphasize cross-tabulation. May 92

★★★★ **DeltaGraph Professional 2.01 (2.02)**, *DeltaPoint*, 408/648-4000, \$295. A smooth interface and outstanding technical support are only two of the stellar features in this graphing and charting program. This upgrade adds 13 new chart types and a number of presentation capabilities. May 92

★★★★ **Fair Witness 1.1 (1.2)**, *Chena Software*, 215/770-1210, \$295. A valuable tool for planning any project, this software coherently integrates outlining, information charts, scheduling, and time charts. Oct 92

★★★★ **FileMaker Pro 2.0**, *Claris Corp.*, 408/727-8227, \$399. Easier scripting, improved mailing labels and text-handling, and support for QuickTime and Apple events are the major new features of this upgraded, multiuser, flat-file database. Although it has some minor bugs, this is a strong upgrade to an excellent program. Jan 93

★★★ **FlowChart Express 1.0**, *Kaetron Software Corp.*, 713/890-3434, \$149. Inexpensive, easy-to-use flowchart software readily meets the needs of most flowchart creators, although those with extensive requirements will still need a larger, more powerful feature set than this program has. Jan 93

★★★★ **GeoQuery 3.02**, *GeoQuery Corp.*, 708/357-0535, \$395. Gain geographic perspective with this custom-map generator and data-analysis software that uses zip codes to create "pushpin" maps of files from your spreadsheet or database. Nov 92

★★★★ **GraphMaster 1.31a (1.33)**, *Visual Business Systems*, 404/956-0325, \$295. Excellent general-purpose charting and graphing program offers a number of unusual features, including pictographs and 360-degree free rotation. A frequent inability to undo actions is the only serious irritation. May 92

☐ **GreatWorks 2.0**, *Symantec*, 408/253-9600, \$299. High marks to this integrated program for including an outlining module and a color paint module. While the integration may not be ideal, it's a solid program, worth a close look.

★★★★ **Lotus 1-2-3 for Macintosh 1.0 (1.1)**, *Lotus Development Corp.*, 800/343-5414, \$495. Spreadsheet program from the other side holds its own against Mac competitors. Its many strengths include graphing, well-implemented linking, compatibility with the DOS version, and an outstanding Help system. Apr 92

★★★★ **MacProject Pro**, *Claris Corp.*, 408/727-8227, \$599. If you're working on a midsize project and like using PERT charts (where tasks appear in boxes and are connected by straight lines), this may be the project-man-

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Star Ratings

agement software for you. However, the multistep scheduling process and the limited integration between charts are frustrating if you prefer Gantt charts. May 93

★★★★ **Microsoft Excel 4.0, Microsoft Corp., 206/882-8080, \$495.** Create impressive spreadsheets with this upgrade that includes all the features you've been wishing for and more. It's slower, and now needs 2MB of RAM for practical use, but almost all users will want to upgrade. Oct 92

★★★★ **Microsoft Project 3.0, Microsoft, 206/882-8080, \$695.** An amazing range of functions, including new scheduling and formatting, are packed into this upgraded project-management software. The improved tool bar helps beginners schedule tasks with push-button ease. Jan 93

★★★★ **Microsoft Works 3.0, Microsoft, 206/882-8088, \$295.** Capable but unspectacular upgrade delivers marginally improved functionality and a welcome face-lift to this integrated program, but there are a number of incompatibilities, odd design choices, and performance flaws. Feb 93

★★★★ **Muse 1.0 (1.01), Occam Research Corp., 617/923-3545, \$695.** Innovative data-analysis software is based on a large, ambitious vision of how to organize and use data, and is an excellent environment for some data handling. Free-form query language is powerful, but easy to misread. Jun 92

★★★★ **nuBase Pro 1.5 (1.54), Tactic Software Corp., 407/832-6691, \$395.** Although still slower than FoxBase and without the rich feature-set of 4th Dimension, this is the only relational database that makes it possible for users with no programming experience to design a useful database. Sep 92

★★ **Office Wiz 1.1 (1.1.2), Oryx Associates, 415/563-9971, \$695.** 4D-based program attempts to integrate calendar, project, and contact management, as well as simple accounting for a multiuser environment, but the complexity of the interface requires a substantial investment in start-up time. Nov 92

★★★ **Omnis 7 1.1, Blyth Software, 415/312-7100, \$1250.** The plain, businesslike functionality of this database-development system produces solid applications without much fuss. Dec 92

★★★★ **OrgChart Express 1.0, Kaetron Software, 713/890-3434, \$279.** Organization-chart software links a database to standard box-drawing functions. Although the learning curve is steep, the effort may be worth it for people who regularly work with large or complex organization charts. Apr 93

★★★★ **Panorama 2.0 (2.06), ProVue Development Corp., 714/892-8199, \$395.** Disarmingly easy-to-learn flat-file database is full of labor-saving data-entry features, plus it boasts a remarkable macro function that lets you record and play back almost any series of database routines. May 92

★★ **PEMD Discovery 1.3.1, PEMD Education Group, 707/894-3668, \$189.** Unsophisticated data-search and -retrieval routines, limited displays, and a weak manual restrict this graphical data-analysis software's usefulness. Apr 92

★★★★ **Perspective 1.5, U.S. Data on Demand, 800/352-7352, \$129.95.** The level of detail and comprehensive information in this collection of U.S. demographic and economic data is impressive, and the reasonable price puts it within reach of even the smallest business. Sep 92

★★★ **PowerPlay 1.0 (1.1), Cognos, 617/229-6600, \$695.** A good program for a very limited range of business-analysis tasks. The views of data and graphs are small and manageable, and the program tabulates them in several colorful ways. Aug 92

★★★ **PowerTrax 1.1 (1.2), Soft Solutions, 404/457-9400, \$495.** Convoluted and repetitive data-entry processes slow you down when they should speed you up in this 4D-based information-management system. Apr 92

★★★★ **RateFinder 1.5 (1.6), Elefant Software, 510/843-7725, \$99.** Numerous interface violations don't change the fact that these all-inclusive shipping-rate tables make the old-fashioned chore of checking mail rates easier and more efficient. Jun 92

★★★★ **ZP4 7 (10), Semaphore Corp., 408/688-9200, \$125.** Clean up and standardize addresses with this CD ROM, thereby reducing postage costs and avoiding undeliverable mail; uses a licensed version of the U.S. Postal Service's official database of every valid postal address in America. May 92

COMMUNICATIONS / NETWORKS

★★★★ **A/UX 3.0, Apple Computer, 408/996-1010, \$709.** Hybrid-operating-system package implements the Stone Age, type-one-line-at-a-time text interface of Unix in a way a Macintosh user might actually like. Nov 92

★★★★ **AccessPC 2.0, Insignia Solutions, 415/694-7600, \$99.95.** Slick control over formatting multiple types of DOS media is the major advantage of this file-transfer utility. Oct 92

★★★★ **Carbon Copy for the Mac 2.0 (2.04), Microcom, 919/490-1277, single-user \$99, multi-user \$299.** Screen-sharing utility is convenient and economical for occasional use but because it competes for RAM on attended low-memory Macs, it isn't efficient enough to use as a global solution for remote-control support. Apr 92

★★★★ **CompuServe Information Manager 2.0.1, CompuServe, 614/457-8600, \$49.95.** The goal of this product is to give friendlier information-access to CompuServe for Macintosh users. An appealing color interface and increased speed are signs of success, but there's still room for improvement. Dec 92

★★★★ **DataClub Classic, DataClub Elite 2.0, Novell, 800/638-9273, \$175, \$1395.** Fully distributed file servers allow users to pool the free space on their drives into one virtual server. File sharing is transparent, but when a participating Mac disconnects from the network, users lose access to files stored on its hard drive. Aug 92

★★★★ **DOS Mounter 3.0, Dayna Communications, 801/531-0600, \$89.95.** If you need to use wild cards in extension mapping, this file-transfer utility is the only option, although it's slower than other file-transfer programs. Oct 92

★★★★ **Macintosh PC Exchange 1.01, Apple Computer, 408/996-1010, \$79.** For basic file-transfer, this control panel device allowing cross-platform file sharing is fine, but it's hardly state-of-the-art. Oct 92

★★★★ **MicroPhone II 4.0 (4.0.2), Software Ventures Corp., 510/644-3232, \$295.** Refinements are evident throughout this telecommunications software's upgrade, but not everyone needs \$295 worth of sophistica-

tion. The impressive scripting facility is countered by poor help features. Jul 92

★★★★ **MicroPhone Pro, Software Ventures Corp., 510/644-3232, \$295.** Truly comprehensive telecommunications package now includes send-and-receive fax software. Although the new TCP/IP tools are complicated, the documentation is clear and precise. Apr 93

★★★★ **NetMounter 1.00 (1.01), Dayna Communications, 801/531-0600, \$99.** Reasonably priced utility provides Macs access to NetWare file servers without your having to install NetWare for the Macintosh on the server. It's not an ideal choice, but it is economical for mixed networks with only a few Macs. Sep 92

★★★ **NetVirtual 2.0, Eclectec, 408/462-2040, \$995, unlimited nodes \$4985.** One-of-a-kind network-simulation product favors flexibility at the expense of usability. Only after hours of work will your simulation report anything meaningful about your network, and even then the results are difficult to analyze. Apr 93

☐ **NetWare for the Macintosh 3.011, Novell, 800/638-9273, \$495-1995.** NetWare 3.11, an expensive but robust network operating system, runs on a non-Mac dedicated server and is complex to manage. This set of NetWare Loadable Modules lets you add Macs to a NetWare network.

★★★★ **Network SuperVisor 2.0.1 (2.1), CSG Technologies, 412/471-7170, \$495.** Fast and accurate data collection is the strong point of this network-management utility, but the interface isn't that intuitive. Aug 92

★★★★ **Network Vital Signs 1.0 (1.1), Dayna Communications, 801/531-0600, \$449.** Fault-monitoring application continually watches selected network devices and services, monitoring specific equipment for specific errors. Unfortunately, when monitoring more than ten devices, it noticeably degrades the performance of the monitoring Mac. Mar 93

★★★★★ **NetWorks 1.0.1 (2.0), Caravelle Networks Corp., 613/596-2802, \$1195.** Become a network demigod with omnipresent capabilities over network devices using this network-management and paging utility. Macworld's network manager loved it, calling it versatile, flexible, and worth its weight in gold. Jun 92

★★ **Notify 1.0, Ex Machina, 718/965-0309, \$149.** Innovative wireless transmitter uses the Mac to send messages to pager. It's a start on a new technology, but the quirky product has a long way to go. Jun 92

★★★★★ **PacerForum 1.0.1, Pacer Software, 619/454-0565, \$549.** Any file server or underused networked Mac can host an online forum using this network bulletin board system. The well-designed graphical interface stands out, although the display looks better on color monitors. Jul 92

★★★★★ **RouterCheck 2.0, Neon Software, 510/283-9771, \$895.** Keep your finger on the pulse of router configurations and internet traffic with this network-administration utility. It's a must for midsize or larger internets, but too pricey for small networks. Oct 92

☐ **SoftPC 2.0 (2.5), Insignia Solutions, 415/694-7600, \$399.** A graceful implementation of the PC architecture on a Mac, this program emulates PC AT hardware through a powerful BIOS that remaps Intel 80286 addresses to a Motorola 68000-series CPU. The main drawback is slowness.

★★★★ **Status Mac 2.0.2 (3.0), On Technology,**

617/876-0900, \$449. With less hassle for network managers and users, this upgrade invites customization in both the collecting and storing of information about networked Macs; users can even delay time-consuming profiling. May 92

★★★★ **TechWorks Net Utilities 1.0, Technology Works, 512/794-8533, \$129.** Collection of five separate applications provides essential network-monitoring tools at a price low enough to please anyone. Dec 92

★★★★ **Timbuktu 5.0.1, Farallon Computing, 510/814-5000, single user \$199, multiuser \$999 to \$5500.** By letting one computer (a Macintosh or a Windows-based PC) control, observe, or exchange data with another computer, this terminal-emulation product allows you to use resources almost anywhere on a network. Despite minor blemishes, such as its inability to cut and paste between Macs and Windows PCs, it's a clear winner. Mar 93

❑ **VersaTerm/Pro 3.1 (3.6.2), Synergy Software, 215/779-0522, \$295.** It's a great tool for working with VAXs or when you want Tectronix-terminal emulation, but this communications software lacks the scripting many people use for working with BBSs or commercial information services.

★★ **Vicom Terminal Emulators (4.2), Vicom Technology, 604/684-9517, \$195 to \$3500.** These bare-bones, British-designed terminal emulators lack many common U.S. modem configurations, but do support multiple simultaneous sessions. Aug 92

❑ **WhiteKnight 11 (11.14), The FreeSoft Company, 412/846-2700, \$139.** In the right hands, this product is the precision tool of communications software, but it does assume familiarity with telecommunications and with programming concepts.

DESKTOP PUBLISHING

❑ **Adobe Type Manager (ATM) 1.0 (2.03), Adobe Systems, 415/961-4400, \$99.** Radically improve the quality of screen fonts and the versatility of QuickDraw printers with this font-optimizing utility that uses information from a printer font (which is also called an outline font) to produce accurate character representations on-screen.

★★★★ **Aldus PageMaker 4.2, Aldus Corp., 206/628-2320, \$795.** Interruptible screen redraw is one of the dozens of enhancements that make this upgrade well worth its price. Even so, some of the features that users need the most—opening multiple documents, for instance—are still missing. May 92

★★ **Aldus Personal Press 2.0, Aldus Corp., 206/628-2320, \$199.** Basic, inexpensive page-layout program adds features and gains strength, but is still missing elements that novice users need, such as automatic kerning. Furthermore, its software-knows-best approach to copyfitting makes manual fine-tuning difficult and is almost certain to confuse and confound beginners. Mar 93

★★★★ **Apple Font Pack, Apple Computer, 408/996-1010, \$99.** Apple's first collection of TrueType fonts includes only 12 fonts that haven't been available since the late eighties in the PostScript format. Still, it's not a bad deal, considering that Adobe PostScript fonts cost four times as much. Mar 93

★★★★ **Fontographer 3.5, Altsys Corp., 214/**

680-2060, \$495. Versatile tools that enable you to edit PostScript typefaces or create your own are the highlight of this font-design software. But beware, some processes are technical and cumbersome. Nov 92

❑ **FrameMaker 3.0 (3.0.1), Frame Technology, 408/433-3311, \$795.** Powerful and well-designed, this page-layout software is the best choice for scientific and technical publishing. It has a fine table editor and allows manual kerning, but its power demands commitment—and a Mac II-class machine.

★★★★ **Lazy Dog Foundry Personal Font, Lazy Dog Foundry, 612/291-0306, \$199.99, full 180-character set \$499.99.** Type 1 font made from your handwriting has clean, even lines—whether or not your writing does. Apr 93

★★★★ **LetraStudio 2.0, Letraset USA, 201/845-6100, \$249.** Precise, intuitive control over character spacing and shapes, as well as a straightforward interface, make this program a superior choice for manipulating type, but it lacks flashy effects, such as gradient fills. Oct 92

★★ **MacQuill 1.0, Nest Software, 408/441-1944, \$99.95.** Friendly, inexpensive page-layout program is missing basic features, such as kerning and importing, and suffers from some bugs and deficiencies, but for simple word processing and grass-roots page layout it's serviceable. Aug 92

★★ **MenuFonts 4.03 (4.04), Dubl-Click Software, 818/888-2068, \$69.95.** A control panel device that groups type styles in families and displays font names in their own typefaces sounds like a great idea, and it would be if there were fewer incompatibilities. May 92

★★★★ **Multiple Master Myriad 1.0, Adobe Systems, 415/961-4400, \$370.** Elegant execution and functional design combine in this two-axis Multiple Master typeface that exceeds all previous ideas of electronic font perfection. Jul 92

★★★★ **Personal Font, Signature Software, 408/458-0241, \$179.95.** Turn your handwriting into a PostScript Level 3 or a TrueType font. The results are good, although not perfect—TrueType letters were not connected on screen, but this should be corrected with TrueType 2.0. Dec 92

★★★★ **Publish It Easy 3.0, Timeworks, 708/559-1300, \$199.95.** Desktop-publishing program offers writing, editing, formatting, page-layout, drawing, and painting tools with well-thought-out interface innovations, plus an excellent database manager. Unfortunately, the program is unstable and crash-prone. Mar 93

★★★★ **QuarkXPress 3.1, Quark, 800/788-7835, \$895.** Dozens of updated features and frustration-relievers in this upgrade include new palettes and preferences, better zooming, and improved text-editing and -formatting. The program, while still not perfectly behaved, is stable, well designed, and full-featured. Jul 92

★★★★ **Renaissance 1.0, Eastman Kodak, 800/433-2839, \$695.** A strange mixture of power and oversight, this page-design and -layout software provides several slick features, including handling multiple page sizes simultaneously, but blatantly ignores common Mac conventions, such as some keyboard shortcuts. Dec 92

★★★★ **Spectacular 1.2, FontHaus, 203/846-3087, \$79.95.** Keep track of fonts efficiently and effectively with this type-specimen generator. Printing specimen sheets is a cinch. Jan 93

EDUCATION

★★★★ **American Discovery 3.0, Great Wave Software, 408/438-1990, \$49.95.** Without glitzy graphics or sound, this educational game, intended mainly for classroom use, provides an excellent drill in geography, state capitals, and state facts. May 92

★★★★ **The Castle of Dr. Brain 1.0, Sierra On-Line, 209/683-4468, \$49.95.** After applying for a job as a lab assistant with the local mad scientist, you must use logic and raw brain-power to navigate a series of rooms, mazes, and hallways on the way to your interview. Puzzles range from simple and mundane to creatively laborious. Dec 92

★★★★ **Compton's Multimedia Encyclopedia 1.00M, Compton's New Media, 619/929-2626, \$795.** The down-to-earth writing style and numerous bells and whistles of this multimedia encyclopedia on CD ROM appeal to younger readers, but the high cost and sluggish performance may be prohibitive. Apr 93

★★★★ **Eco-Adventures in the Ocean, Eco-Adventures in the Rainforest 1.0, Chariot Software Group, 619/298-0202, \$59.95.** Explore the ocean or rainforest while avoiding pitfalls and predators in these educational adventure games. Imaginary landscapes that combine features found in different environments may confuse some students. Nov 92

★★★★ **Headline Harry and the Great Paper Race 1.0, Davidson & Associates, 310/793-0600, \$59.95.** Travel through time and across the country as a journalist in this history/geography game. While not an educational masterpiece, it is lots of fun. Dec 92

★★★★ **MacGlobe 1.3.0, Brøderbund Software, 415/382-4400, \$59.95.** Besides maps and bits of fun, such as national anthems, this geography software offers an impressive quantity of demographic and economic information. While it could stand some improvement in data export, it provides a fascinating intellectual adventure for home and school use. Feb 93

★★ **Math Shop, Math Shop Jr., Advanced Math Shop 1.0, Scholastic, 800/541-5513, \$24.95.** The humdrum workbook format is converted into bits and bytes with these mathematics education games. May 92

★★★★ **The New Grolier Multimedia Encyclopedia, Grolier Electronic Publishing, 203/797-3530, \$395.** The remarkably current and scholarly text of this encyclopedia on CD ROM is suitable for sophisticated readers, while its speed, ease of use, and value are impressive. Apr 93

★★ **NihongoWare, Vol. 1, Qualitas Trading Company, 510/848-8080, \$623.** Although this Japanese language CD ROM offers solid instruction, it's so expensive and so limited in its word selection that it's not an economical choice for individual users. Jan 93

★★★★ **Number Munchers 1.1 (1.2), MECC, 612/569-1500, \$29.95 to \$69.** Fun, educational game builds arithmetic skills through arcade action. Munchers gobble your choice of multiples, factors, primes, equalities, and inequalities, but the game can't accept custom data sets. Jun 92

★★ **Picture It 1.0 (1.4), Penton Overseas, 619/431-0060, \$69.95.** If you add custom word lists, this interactive French-English picture dictionary may serve as a *continues*

Star Ratings

decent aid to a more complete curriculum, but it's buggy and of uneven quality. Aug 92

★★★ **The Secret Codes of C.Y.P.H.E.R. 1.0 (1.1), Tanager Software Productions, 510/430-0900, \$59.95.** Intriguing facts about mammals and a variety of alphabets provide the interest in this educational game, but the inescapable, repetitive animations are a major detractor. Apr 93

★★★ **StudyWare for the SAT 3.7N (4.0), Cliffs Notes, 402/423-5050, \$49.95.** Four full SATs, a TSWE (Test of Standard Written English), and a series of drills are included with this inexpensive SAT-training program. It doesn't provide a lot of tutorial assistance, but it might be appropriate for students who need a quick brushup. Jun 92

★★★★ **Super Munchers 1.0, MECC, 612/569-1500, \$49.95 to \$69.** From a kid's point of view, this educational arcade game offers long-lasting appeal. The player maneuvers a cartoon Muncher around a game board, gobbling up words that fit target rules, such as Romantic composers or European countries. Jun 92

★★★★ **Time Treks 1.0, Earthquest, 415/321-5838, \$59.95.** An eccentric archaeologist opens portals through time, and you must close them in this educational, HyperCard-based game. Slow response time and limited animation and color are somewhat disappointing, but overall it's a fun way to browse through history. Sep 92

★★★★ **Transparent Language 1.04M, Transparent Language, 603/465-2230, \$139.** Without an iota of glitz or glamour (no sound, graphics, color, or buttons), this foreign-language reader is a superb tool for bolstering language skills through reading. Oct 92

★★★★ **Where in America's Past Is Carmen Sandiego?, Broderbund Software, 415/382-4400, \$44.95.** Travel through time and the United States while chasing those V.I.L.E. crooks in this clever educational history/geography game that's challenging for all ages. Mar 93

★★★★ **Where in the World Is Carmen Sandiego? Deluxe Edition, Broderbund Software, 415/382-4400, \$79.95.** The V.I.L.E. gang is at it again, stealing famous objects and fleeing to locations around the world. In this deluxe version of the well-known geography game, there are more crooks, more clues, and more countries to visit. Oct 92

★★★★ **Word Munchers 1.0 (1.2), MECC, 612/569-1500, \$29.95 to \$69.** Munch the words with matching vowel sounds in this educational game for grades 1 to 5+. Dazzling color graphics stand out, but the repetitive cartoon sequences get tiresome. Jun 92

★★★★ **World Atlas 1.2, Software Toolworks, 415/883-3000, \$79.95.** Extensive, detailed maps of countries and regions are the highlight of this atlas software. In addition, descriptive headings report interesting text-based demographic data. Apr 92

ENTERTAINMENT

★★★★ **4-D Boxing 1.0, Electronic Arts, 415/571-7171, \$49.95.** Authentic motion and multiple viewing angles are the best features of this entertaining boxing game, but off-disk copy protection, geometric figures, and the inability to save games in progress make it less enticing. Sep 92

★★ **America Alive, MediaLive/CD Tech-**

nology, 408/752-8500, \$99. QuickTime movies, color photographs and maps, text, and audio mingle in this multimedia CD ROM guide to the United States. It's a promising concept, but it doesn't yield much useful information. Mar 93

★★★★★ **Arthur's Teacher Trouble, Broderbund Software, 415/382-4400, \$59.95.** Every page of this delightful animated book is dense with surprises that arouse and satisfy a child's curiosity. In the words of six-year-old Alex, "It's like chocolate ice cream. You can have it more than once and it's still good." Apr 93

★★★★★ **A-Train, Maxis, 510/254-9700, \$69.95.** Charming railroad simulation offers astonishing, and often witty detail, but the learning curve is high and the interface isn't completely Mac-like. Apr 93

★★★★ **Audioshop 1.0 (1.03), Opcode Systems, 415/856-3333, \$89.95.** Audiophiles will get a kick out of applying sound effects to any sound file on their Macs. You can also control the order of songs or sounds on an audio CD played on a CD ROM player. A number of quirks may confuse new users. Sep 92

★★★★ **Battle Enhanced Chess CD ROM, Interplay Productions, 714/553-6678, \$79.95.** Elaborately detailed cartoon characters act out little dramas of strategy and capture, complete with sound effects, in this chess game that will drive nine-year-olds mad with glee but may annoy experienced chess players. Mar 93

★★★★ **The Battle of Britain, Deadly Games, 215/295-2284, \$54.95.** It's August 10, 1940. The badly outnumbered British must defend their country against the invading Luftwaffe, and you're in charge. Although the graphics and sound are not spectacular, this is an entertaining, thinking person's game. Dec 92

★★★★ **Blade 1.1 (2.0), Leviathan Corp., 313/826-3560, \$99.95.** Surreal graphics in this fantasy martial-arts game are spectacular—a cross between Dali and Seuss—but the arcade action is extremely difficult to master. Sep 92

★★★★ **Capitalist Pig 1.0 (1.02), Pluma Software, 602/969-9441, \$59.95.** Terrorist attacks, embezzlement, fires—keeping a cool head is half the challenge if you are to become successful in this business-simulation game. No clear end point means that getting rich, retiring, and writing novels is not an option. Sep 92

★★★★ **Cogito 1.0, Inline Design, 203/435-4995, \$59.95.** Rubik's Cube fans will like this challenging game where the goal is to replicate a pattern by moving rows and columns of tiles. The deviously simple twist is that clicking on the arrows that control movement results in reactions that are more and more complex as you progress through the 120 levels. Apr 93

★★★★ **The Complete Annotated Alice 1.0, The Voyager Company, 310/451-1383, \$19.95.** Fans of *Alice's Adventures in Wonderland* will love the "lost" out-of-print chapter in this HyperCard book designed primarily for PowerBook users. As literary hypertext hide-and-seek, it works. Jun 92

★★ **Creepy Castle 1.0, Reactor, 312/573-0800, \$49.95.** Wolfman, the Bride of Frankenstein, and other ghouls from classic horror movies populate this clever arcade-style game. Still, delightful movie trivia doesn't compensate for frustrating performance delays and limited scenarios. Jun 92

★★★★ **Cross Country 1.0 (2.0), T-34 Microsystems, 904/396-2785, \$179.95.** No unnecessary

frills complicate this efficient, inexpensive instrument-flight trainer. It doesn't have a true aerodynamic feel, but that flaw's not critical. Jul 92

★★★★ **Cyberblast 2.01, Innerprise Software, 410/560-2434, \$49.95.** Aliens have overrun the 64 levels of Fastrax Labs, and it's your job to get rid of them in this arcade game. While it's not the most unusual game in the universe, it's a nice, basic shoot-'em-up, with clever execution and appealing graphics. Sep 92

★★★★ **Go Master 5, Toyogo, 808/396-5526, \$69.** Go has been called the most interesting board game ever invented. This excellent software version incorporates helpful learning aids and sample games. Dec 92

★★★★ **HardBall II, Accolade, 408/985-1700, \$54.95.** From the pitcher's windup to the batter's swing, this baseball game comes astonishingly close to natural human motion. The upgrade adds more teams, more stadiums, instant replay, and the ability to create your own league. May 92

★★★★ **Hellcats Over the Pacific 1.0.3, Graphic Simulations, 214/699-7400, \$69.95.** Fly a WWII-era Navy fighter, the Grumman F6F Hellcat, against enemy planes in the South Pacific with this flight simulator that offers smooth graphics, good special effects, and great documentation. Apr 93

★★★★ **Insanity 1.0, UV Wave, 318/868-9944, \$28.95.** Shoot your Mac with this cool control panel device that offers a choice of nine weapons, ranging from an Uzi to a pigeon. It has first-rate sound effects and detailed animation, but the novelty wears off. Feb 93

★★★★★ **Just Grandma and Me, Broderbund Software, 415/382-4400, \$49.95.** Mercer Mayer's Little Critter comes to life in this charming, captivating, wondrously entertaining, interactive storybook on CD ROM. Aug 92

☑ **Kid Pix 1.0 (2.0), Broderbund Software, 415/382-4400, \$59.95.** An entrancing, enchanting color paint program aimed at children but delightful for grown-ups, too. Hilarious sounds, hidden surprises, spectacular effects, zany and creative tools—it's a classic.

★★★★ **Kid Pix Companion, Broderbund Software, 415/382-4400, \$39.95.** Addition to Kid Pix adds clever new features, including the world's easiest-to-use QuickTime movie and presentation modules, but it's less appealing than the delightfully simple original. Oct 92

★★★★ **Mozart: The "Dissonant" Quartet, The Voyager Company, 310/451-1383, \$59.95.** This CD ROM includes an unusual essay on the anatomy of stringed instruments, brief discussions of general musical concepts, an analytical overview of the quartet, and a taped minilecture on Mozart's life, but sadly enough the music is limited almost entirely to the title piece. Apr 93

★★★★ **Nobunaga's Ambition 1.0, Koei Corp., 415/348-0200, \$59.95.** Visit the Warring States period of feudal Japan, unify the country, and usher in an era of peace. Strategy game is absorbing and challenging, but the interface can be annoying. Jun 92

★★ **The Orchestra: The Instruments Revealed, Warner New Media, 818/955-9999, \$79.98.** The many-branched, interwoven hypertext style of this music-education CD ROM makes the program hard to navigate and digest, despite its richness. For the price, other music-education CD ROMs present better values. Apr 93

★★★★ **Patton Strikes Back: The Battle of the Bulge, Broderbund Software, 415/382-4400,**

\$19.95. Military simulation game with superior graphics is simple to learn and satisfyingly complex. If only they'd skipped the off-disk copy protection. **Jun 92**

★★★★ **Poetry in Motion, The Voyager Company, 310/451-1383, \$29.95.** Performance videos of contemporary poets are juxtaposed with the texts of their poems and taped interviews in this intriguing CD ROM that combines the excitement of the stage with the reflective appeal of the page. **Feb 93**

★★★★ **Prince of Persia, Brøderbund Software, 415/382-4400, \$49.95.** You need a high tolerance for frustration to negotiate the 12 mazelike levels of dungeon and palace in this arcade adventure, but amazingly realistic (although gory) animation, stunning graphics, and entertaining challenges make it all worthwhile. **Sep 92**

★★★★ **Red Baron 1.0, Dynamix, 800/326-6654, \$69.95.** The romance of history and the realism of a flight simulator combine in this World War I flight game. Despite small annoyances, including too many dialog boxes to get to the simulation, this game will charm any aspiring ace. **Nov 92**

★★★★ **Richard Strauss: Three Tone Poems, The Voyager Company, 310/451-1383, \$59.95.** *Don Juan*, *Till Eulenspiegel*, and *Death and Transfiguration* are the three works included in this CD ROM, with a program written by Russell Steinberg. The musical analysis is satisfying and the lush orchestral music will appeal to both novice and experienced classical music listeners. **Apr 93**

★★★★ **Rodney's Wonder Window, The Voyager Company, 310/461-1383, \$39.95.** Collection of 23 colorful, wacky graphics and animations by Rodney Alan Greenblatt is charming but uneven. The overall look is surreal and cartoonish, but while some modules are elaborate and sophisticated, others are simple and not particularly interesting. **Mar 93**

★★★★ **Schubert: "The Trout" Quintet, The Voyager Company, 310/451-1383, \$59.95.** Alan Rich, classical music commentator for National Public Radio, conveys his enthusiasm for this appealing music in the lively text of this CD ROM. However, the discussion is relatively unchallenging and the musical performance, though well regarded, is not at the top of most reviewers' lists. **Apr 93**

★★★★ **The Secret of Monkey Island 1.0, LucasArts Games, 415/721-3300, \$59.95.** A genuinely amusing, interactive tale of swashbuckling and daring deeds using splendid 256-color graphics and an original soundtrack. Low screen resolution and irksome copy protection only slightly spoil the delight. **Sep 92**

★★★★ **Shanghai II: The Dragon's Eye, Activision, 310/207-4500, \$49.95.** Classic tile game is more addictive than ever; flashy enhancements include new tiles and layouts, plus an additional, entirely new game that's a variation on the tile-removal theme. **May 92**

★★ **Sherlock Holmes, Consulting Detective 1.0, Icom Simulations, 708/520-4440, \$69.95.** Accompany Sherlock Holmes and Watson as they investigate three CD ROM-based mysteries. Primarily made up of video scenes, this game's only slightly more interactive than TV, and the picture's not as good. **Aug 92**

★★★★ **A Silly Noisy House 1.0, The Voyager Company, 310/451-1383, \$59.95.** A brightly colored animated world awaits exploration; this CD ROM's simple scenes and syrupy songs are perfect for preschoolers. **May 92**

★★★★ **SimAnt 1.0, Maxis, 510/254-9700, \$59.95.** Marauding red ants, ant lions, spiders, even power mowers—an ant's life is likely to be short in this remarkably detailed simulation game in which the object is to have black ants amass territory in a suburban backyard. **Apr 92**

★★★★ **SimLife, Maxis, 510/254-9700, \$69.95.** A megalomaniac's dream come true, this amazingly intricate simulation game allows players to create and control ecosystems. It's not easy, but the reward is an increased understanding of the complex interrelationships of life. **Feb 93**

★★★★ **So I've Heard, Volume 1: Bach and Before, The Voyager Company, 310/451-1383, \$24.95.** Engaging text by classical-music critic and lecturer Alan Rich describes nearly two millennia of western music (up to the mid-eighteenth century) in this CD ROM. It offers a unique and affordable opportunity to sample 50 or so performances, styles, and compositions. **Feb 93**

★★★★ **Space Quest 1: Roger Wilco in the Sarien Encounter, Sierra Online, 209/683-8989, \$29.95.** As Roger Wilco, starship janitor, you must defeat the evil Sariens in this adventure game where your head is more important than your hands. Puzzles range from the obvious to the head-scratching, but for most players the game will be easy to complete. **Apr 93**

★★★★ **Spaceward Ho 2.0.1, Delta Tao Software, 408/730-9336, \$59.** A happy planet is a profitable planet in this absorbing, humorous strategy game of interstellar capitalism and imperialism. **Aug 92**

★★★★ **Spectre 1.0, Velocity Development Corp., 415/776-8000, \$59.95.** Fight enemy tanks in a 3-D arcade game that is at once basic and extremely addictive. When installed on a network, it's one of the great antiproduktivity tools of all time. **May 92**

★★★★ **Spelunx and the Caves of Mr. Seudo, Brøderbund Software, 415/382-4400, \$49.95.** Unanticipated giggles, rich graphics, entertaining sounds, and creative learning activities fill this interactive hyperworld. We recommend it, despite its tiny bugs. **Jul 92**

★★★★ **Super Mines 1.0, Callisto Corp., 508/655-0707, \$49.95.** You use your logic to search a minefield without setting off the mines in this fast-paced game that's easy to learn but offers 84 levels for long playability. **Apr 93**

★★★★ **Super Tetris, Spectrum HoloByte, 510/522-3584, \$49.95.** Teensy tiles are a very minor negative in this exceptional tile game that's more varied, more challenging, and more forgiving than the original. **Oct 92**

★★ **Surgeon 3, The Brain 1.0 (1.1), ISM, 410/560-0973, \$59.95.** Surgical-simulation game with realistic graphics and sound can be entertaining and educational, but it's overly intolerant of mistakes—not for the faint of heart or the easily frustrated. **Sep 92**

★★★★ **Warlords, Strategic Studies Group, 904/494-9373, \$59.95.** A medieval fantasy world is the setting for this colorful game of strategy and conquest with beautiful graphics. Unfortunately, the computer opponents are not challenging enough for an experienced war-gamer, although human opponents may be. **Dec 92**

★★★★ **Wordtris, Spectrum HoloByte, 510/522-3584, \$49.95.** Tetris's falling blocks are letters in an arcade game for Scrabble lovers. Lots of variations, including modes for children, tournaments, and head-to-head play on a network, make it a super game. **Jun 92**

GRAPHICS

★★★★ **Adobe Dimensions, Adobe Systems, 415/961-4400, \$199.** This three-dimensional-effects utility may seem very limited, with white-only light and no surface texturing, but it's a ground-breaking product. It performs its 3-D illusions within the object-oriented, resolution-independent world of PostScript and is an excellent tool for anyone who works extensively in Adobe Illustrator or Aldus FreeHand. **Apr 93**

✓ **Adobe Illustrator 3.0.1, Adobe Systems, 415/961-4400, \$695.** Adept transformation and reshaping capabilities and superb text-handling stand out in this object-oriented illustration program. It also includes features found in no other Macintosh draw program, such as tools to create line and bar graphs.

✓ **Adobe Photoshop 2.0.1, Adobe Systems, 415/961-4400, \$895.** With complete mastery of the bitmapped, continuous-tone environment, this product is the industry standard for image manipulation. Although it's not perfect, it's so good that if you make your living in graphic art, it's worth the price of a Mac itself.

★★★★ **Aldus FreeHand 3.1 (3.11), Aldus Corp., 206/628-2320, \$595.** A pressure-sensitive freehand tool is the most remarkable new feature of this updated drawing program. Substitution for missing fonts is another good addition, but skimpy text-editing tools and incomplete support for EPS continue to diminish its value. **Jun 92**

★★ **Aldus Gallery Effects 1.0 (1.5), Aldus Corp., 206/628-2320, \$199.** Uninspiring collection of 16 image-editing filters has an unusually strong manual. **Apr 92**

★★★★ **Alias Sketch 1.0.2 (1.5), Alias Research, 800/447-2542, \$995.** The unique collection of tools makes this the only program that allows you to sit down and play with 3-D rendering. Failings include quirky navigation and sluggish performance. **Aug 92**

★★★★ **ArchicAD 4.02 (4.1), Graphisoft USA, 415/737-8665, \$4450.** The simple yet powerful 3-D interface in this CAD package builds on a construction metaphor. The integrated product incorporates most of the features an architect needs. **Jun 92**

★★ **ArtBeat Professional 1.0, Pie Practical Solutions, 201/902-9500, \$249.** Despite a smattering of unique capabilities, this inexpensive draw and paint program lacks many of the features of equivalent programs. **Apr 93**

★★ **AutoCAD Release 11, Autodesk, 415/332-2344, \$3500.** Customizable, bare-bones drafting upgrade partially implements a graphical user interface. Few add-ons are currently available. **Dec 92**

★★★★ **CA-CricketDraw III 1.0, Computer Associates International, 408/432-1727, \$249.** Although not revolutionary, this draw program boasts some original implementations, including dramatically improved gradations. **May 92**

★★★★ **Cachet 1.0, Electronics for Imaging, 415/742-3400, \$595.** The tools, interface, output, and documentation of this color-image editor are all quite impressive for a first version, but serious failings include slowness and disappointing sharpening. **Dec 92**

✓ **Canvas 3.0 (3.0.6), Deneba Software, 305/596-5644, \$399.** Discovering the complex nuances of this draw program's immense feature list isn't easy, but it's continues

Star Ratings

well worth the effort. The precision drawing functions in particular should appeal to many users.

★ **Claris CAD, Claris Corp., 408/727-8227, \$899.** Serious but basic CAD package has fallen behind the competition after a long period without an upgrade. Nonetheless, this is one of the fastest products available for scrolling and zooming—important for work on large, complex drawings.

★★★ **Color It 2.0.1, Timeworks, 708/559-1300, \$299.95.** Overpriced color paint program has a full range of painting and image-retouching capabilities, including 15 levels of undo and an impressive magic-wand tool, but its naming conventions are bewildering. Apr 93

★★★ **DesignCAD 2D/3D 3.0.1, DesignCAD, 918/825-4848, \$299.95.** Despite slow rendering, this general-purpose 3-D modeler with 2-D drafting capabilities represents a price and performance breakthrough in 3-D modeling programs. Nov 92

★★★★ **ElectricImage Animation System 1.5.1, Electric Image, 818/577-1627, \$7495.** The most powerful animation program for the Mac improves its documentation and rendering, and adds an intuitive project window that allows you to control all aspects of animation from a single location. Unfortunately, it still retails for the price of a European vacation for two. Feb 93

★★★★ **Expert Color Paint 1.0, Expert Software, 305/567-9990, \$49.95.** A wonderful value for novices, this color paint program offers a tidy collection of features for an astonishingly low price. Beware of low memory settings, though, or it gets buggy. Jun 92

★★★★ **Fractal Design Painter 1.2 (2.0), Fractal Design Corp., 408/688-8800, \$349.** An expanded collection of paper textures and four new watercolor brushes add appeal to an already strong set of painting tools. Minor complaints include unsophisticated gradation and fill capabilities and an insensitive Undo command. Aug 92

★★ **Image Assistant 1.0, Caere Corp., 408/395-7000, \$495.** Besides unsatisfactorily addressing Adobe Photoshop's small list of liabilities, this image-editing software is barely able to keep up with less expensive bitmap editors. Problems include an unforgivable lack of antialiased text, no selective revert function, and an incorrectly implemented smudge tool. Apr 93

★★★★ **Infini-D 2.0 (2.5), Specular International, 413/549-7600, \$995.** Rich combination of 3-D modeling, rendering, and animation tools at a relatively affordable price. Visualization program works well, offers a nicely integrated approach to rendering, and is generally stable. Jan 93

★★★★ **IntelliDraw 1.0, Aldus Corp., 206/628-2320, \$299.** Crowd-pleasing features such as physical and dynamic links make this automated draw program a great environment for planning and presenting, although it's less satisfying as a free-form drawing tool. Nov 92

★ **MacDraw Pro 1.0v1 (1.5), Claris Corp., 408/727-8227, \$399.** The shallow array of integrated features in this draw program is perfect for the new or moderately experienced user, but compared with other programs in the same price range, it's slow and deficient.

★ **MacPaint 2.0, Claris Corp., 408/727-8227, \$125.** Easy-to-use black-and-white paint program takes up very little RAM, but it adds few capabilities beyond those it offered eight years ago.

★ **MacRenderMan 1.0 (1.3), Pixar, 510/236-**

4000, \$695. This dedicated renderer provides an extremely sophisticated, albeit sometimes difficult, way to generate 3-D images. Currently the most widespread rendering scheme, it uses algorithms to create textures, bumps, lights, fog, and practically every other element of an image.

★★★★ **MinicAD+ 4, Graphsoft, 410/461-9488, \$795.** Professionals should be delighted with this highly competent CAD package's evolution into 3-D. It has maintained its features-champion status and is easier to use. Mar 93

★★★★ **Paint It 1.0, Timeworks, 708/559-1300, \$59.95.** Straightforward color paint program lacks image-editing tools but has a versatile cast of selection and painting tools—and it's priced to sell. Apr 93

★★★★ **Ray Dream Designer 2.02 (2.04), Ray Dream, 415/960-0765, \$895.** Experienced 3-D aficionados will find this 3-D imaging software a welcome addition to their arsenal, and beginners may find it ideal for the leap from two dimensions to three. Improved text-handling and viewing capabilities would make it even better. Sep 92

★★★ **ScanMatch 1.01 (1.02), Savitar, 415/243-3030, \$199.** Basically half a color-calibration system. Software quickly and easily adjusts color scan files for screen display, with somewhat uneven results; those wishing to adjust images for print purposes need to use another application. May 92

★★★★ **Showplace 1.1 (1.1.1), Pixar, 510/236-4000, \$695.** Straightforward graphics application organizes shading and rendering processes into five basic components. Beginners will like the simple interface, but the feature set is small for experienced users. Jun 92

★★★★ **Sketcher, Fractal Design, 408/688-8800, \$149.** A variety of effects reproduce the styles and techniques of traditional drawing tools with this wonderful gray-scale paint and image processing program. Feb 93

★★★★ **Smoothie 1.02, Peirce Software, 408/244-6554, \$149.** Create smoother screen images with this handy utility that antialiases the edges of on-screen artwork. Although it can't accommodate sound or accept imported QuickTime movies, it's a must for anyone who uses a Mac for presentations. Nov 92

★★ **StrataType 3d 1.0, Strata, 801/628-5218, \$295.** The rulers, texture palette, custom bevels, and canned positioning schemes of this 3-D type-effects software are nice, but they can't compare with the animation skills, single-character positioning features, lighting capabilities, and superb rendering of other available programs. Mar 93

★ **Swivel 3D Professional 1.0 (2.0), MacroMedia, 415/252-2000, \$695.** Relatively unusual cross-sectional technique makes this 3-D modeler a great tool, especially for fast prototyping. It provides a quick and easy way to create a variety of shapes.

★★★★ **Typestry 1.0, Pixar, 510/236-4000, \$299.** Type enters the third dimension with this reasonably priced 3-D typographic effects and animation program. There's room for improvement, but it's an exciting tool for designers, multimedia producers, and those who enjoy working with type. Nov 92

★ **TypeStyler (2.0), Broderbund Software, 415/382-4400, \$219.95.** The 35 shapes of this product's library let you reshape PostScript or TrueType fonts to create decorative special effects such as arches and perspective. TypeStyler turns fonts into graphics, enabling you to

stretch, compress, or rotate text, as well as add colors, grays, or patterns.

★★ **Zeus 0.91 (0.92), Delta Tao Software, 408/730-9336, \$499.** Color paint program tries hard to match capabilities found in more expensive programs, but not always successfully. It's brimming with good ideas that are poorly implemented. Aug 92

MATH/SCIENCE

★★★ **Caduceus Physics 1.0, Scientia, 617/776-3427, \$159.95.** Giant HyperCard stack consists of carefully indexed cards covering small conceptual bites of physics; it's the first in a series of programs designed to prepare students for the Medical College Admissions Test (MCAT). Jan 93

★★★★ **Data Desk 4.0, Data Description, 607/257-1000, \$595.** For finding patterns in data, this statistical-analysis program has no peer. Years of refinement have made it a unique, and uniquely valuable, tool for analysis, despite its lack of some tests found in larger programs. May 93

★★★★ **Entrypaq 3.0, Albathion Software, 415/824-2737, \$149.95.** Low-end expert-systems shell is an excellent teaching tool, but the slow performance and HyperCard interface rule it out for practical implementation. Nov 92

★★★★ **Expert Astronomer 1.0, Expert Software, 305/567-9990, \$49.95.** Draw maps of the sky from any location in the Solar System and learn about celestial objects with this astronomy software. Most effective in color, this is a great educational tool for beginners and a reference database for experts. Dec 92

★★★★ **Expressionist 3.0, Prescience Corp., 415/543-2252, \$199.95.** If you work regularly on similar topics, you can customize this equation-writing software so that it produces equations with exactly the appearance you want, letting you work at amazing speed. Mar 93

★★★★ **HiQ 1.0 (1.1), Bimillennium Corp., 408/866-2010, \$695.** A script language, which exhibits an endearing nonchalance about data structures and typing of variables, is only one of the impressive features of this formidable numerical mathematics software. Oct 92

★★★★ **Interactive Physics II 1.0 (1.01), Knowledge Revolution, 415/553-8153, \$399.** Motion simulation software is an improvement over traditional classroom instruction in physics. This new version greatly expands the range of problems that can be solved, and adds support for QuickTime. Dec 92

★ **JMP 2.0 (2.05), SAS Institute, 919/677-8000, \$695.** You get lots of value for your money with this statistical-analysis program and its vast assortment of functions, including strong classical statistics and visualizations, 3-D spin features, quality-control statistics, and a manual that is a model of concise clarity.

★★★★ **MacBreadboard 1.1, Yoeric Software, 919/644-1620, \$59.95.** Useful educational engineering software simulates with excruciating detail every aspect of a digital integrated-circuit breadboard trainer. It accurately replicates and even surpasses the behavior of a physical breadboard—without burning out IC chips. Dec 92

★★★★ **Maple V, Brooks/Cole Publishing, 800/354-9706, \$450.** For functional scope and ease of use on a basic Mac (such as a Classic or Plus), this symbolic math software has no competitors. May 92

■ **Mathematica 2.0 (2.1), Wolfram Research, 217/398-0700, \$595.** While its memory demands are high, this symbolic-math program offers a truly vast array of functions, including over 800 numerical and symbolic routines. The quality and quantity of its support literature are outstanding.

★★★★ **MathType 3.0, Design Science, 310/433-0685, \$199.** This equation-writing software makes automatic typographical decisions, which is helpful if you produce documents on a wide range of subjects. Its smooth integration with Microsoft Word is also convenient. Mar 93

★★★★ **Minitab 8.2, Minitab, 814/238-3280, \$695.** These statistical-analysis tools are broad but not exhaustive. Still, they're easy to learn and easy to use, making Minitab an excellent teaching tool. The graphics and output are unfortunately typewriter-like. Jun 92

★★ **NueX 1.1 (1.3), Charles River Analytics, 617/491-3474, \$295.** Lightweight introduction to artificial neural networks and knowledge-based expert systems has some merit, but cannot be considered a serious production tool. Oct 92

★★★★ **Sequencher 2.0, Gene Codes Corp., 313/769-7249, \$2200.** While not implementing everything a DNA researcher could want, this software for manipulating DNA-sequence information does provide the things a researcher really needs. The single best feature is its raw speed. Dec 92

★★★★ **SigmaPlot for the Macintosh 4.11, Jandel Scientific, 415/924-8640, \$495.** It's a short path from raw data to publishable graphs with this scientific graphing software. The Macintosh fundamentals need polish, but the program offers unique analytic capabilities. Jul 92

★★★★ **Simulink 1.2, The MathWorks, 508/653-1415, \$3995.** If you hear the word *Bode-plot* several times a week at work, this math-simulation software is designed to make your life wonderful. Little glitches and a command-line orientation are drawbacks. Dec 92

★★★★ **StatView 4.0m, Abacus Concepts, 510/540-1949, \$595.** A nice mix of statistical prowess and operating convenience distinguish this statistical-analysis and presentation software. The printing options are outstanding. Nov 92

★★★★ **TeMath 1.0, Brooks/Cole Publishing, 800/354-9706, \$39.95.** For roughly the price of a textbook, this mathematical-exploration software provides all the help a student needs to understand what's really happening in differential and integral calculus. Apr 92

ORGANIZATION/PRODUCTIVITY

★★ **ACT 1.0, Contact Software International, 214/919-9500, \$395.** While this contact manager has several laudable features, such as customizable contact views and an integrated word processor, learning how to use it is a frustrating experience. Feb 93

★★★★ **Active Memory 2.0, ASD Software, 714/624-2594, \$199.** Personal organizer distinguishes itself by providing strong network support, although it may be overkill for a lone user. Aug 92

■ **Address Book Plus 2.0, PowerUp Software, 415/345-5900, \$99.95.** What you see is what you get with this field-based address-book software that sorts, selects, formats, and prints names and addresses in every conceivable way. The disadvantage is that the product is

slow, especially with more than 200 addresses in a file.

★★★★ **Agent DA 2.0 (2.1.1), TeamBuilding Technologies, 514/278-3010, \$129.** Simple, flexible calendar/reminder program includes every obvious calendar function—easy navigation, extensive print options, adjustable displays, recurring events, and even a straightforward manual. Sep 92

★★★★ **Amaze Daily Planners: Cathy, The Far Side, Word-A-Day (2.0/1993), Amaze, 206/820-7007, \$59.95.** A cartoon (or word) a day makes scheduling more fun with these icon-based calendar/daily planners, but the graphics take up a lot of hard drive space, and the programs must be running in order for alarms to sound. Sep 92

★★ **Connections 2.1, Concentrix Technology, 415/358-8600, \$199.** A wider range of scheduling features, new printing options, and improved networking capabilities don't change the fact that this HyperCard-based personal information manager is just too slow. Nov 92

★★★★ **DateBook 1.5.1, After Hours Software, 818/780-2220, \$125.** Personal time manager offers a flexible approach to event scheduling and to-do-list management. This upgrade adds new features and fixes bugs that plagued the first version. Feb 93

★★★★ **DayMaker 2.0, Pastel Development Corp., 212/941-7500, \$129.95.** If you need to organize lots of disparate information, follow up on meetings with many people, keep track of your own calendar, create an archive of completed work, and print out lists of to-do items to take on the road, this free-form personal information manager is a great choice. May 93

★★★★ **Dynodex 3.0, Portfolio Software, 408/252-0420, \$89.95.** The speed and printing options of this field-based address-book manager are still its strengths, but this upgrade brings welcome improvements to the interface, including automatic formatting of phone numbers. Apr 93

★★★★ **EasyAlarms 2.0.3, Essential Software, 914/889-8365, \$99.** Complex, flexible calendar, reminder, and to-do list program includes scripting and sound recording among many other features. Nov 92

★★★★ **First Things First 2.0 (3.0), Visionary Software, 503/246-6200, \$69.95.** The nifty on-screen clock that floats serenely above your windows is the most appealing feature of this good but basic event-reminder utility. Apr 92

★★ **Hello, Atelier Systems, 619/453-4300, \$99.** Unusual combination of contact management and word processing in a compact package. This first release is hampered by several notable flaws, such as text documents that must be linked to a contact name. Jan 93

★★★★ **In Control 1.0 (2.0), Attain Corp., 617/776-1110, \$129.95.** Shrink an immense list down to a bare skeleton and expand it again using this to-do-list manager's clean interface and collapsible row-and-column format. May 92

★★★★ **Inspiration 4.0, Inspiration Software, 503/245-9011, \$295.** Watch your ideas evolve in a dynamic diagram mode and a text-based outline mode with this brainstorming tool. It works best as a vehicle for organizing and developing ideas. Feb 93

★★★★ **Intouch 2.0.4, Advanced Software, 408/733-0745, \$99.95.** Free-form database is a fast and easy way to manage contact information. Program offers flexible data entry instead of automatic formatting. Although

this version adds a handy reminder system, it falls short as a calendar planner. Feb 93

★★★★ **Nolo's Personal RecordKeeper 3.0, Nolo Press, 510/549-1976, \$34.96.** Hierarchically configured database organizes your personal affairs, including legal matters, financial records, insurance plans, family history, and more, but it is frustratingly inflexible. Jan 93

★★★★ **Now Up-to-Date 1.0.1, Now Software, 503/274-2800, \$99.** The swift performance and logical structure of this network calendar program make it easy to use, but deficiencies, such as the lack of a to-do-list function, are frustrating. Oct 92

★★★★ **Office Manager 2.1 (2.5), White Crow Software, 800/424-0310, \$99.** Simple contact- and project-management software is powerful for small databases, but reliance on HyperCard limits its usefulness for low-end Macs. Dec 92

★★★★ **Spiral 1.0, Technology Works, 512/794-8533, \$129.** Designed for taking and organizing notes, this product provides an excellent feature set, including tabs, bookmarks, and an option for automatically expanding abbreviations, but it's marred by some annoying errors in the editing and import/export processes. Mar 93

★★★★ **TouchBase 2.0 (2.0.1), After Hours Software, 818/780-2220, \$125.** Entering data is quick and easy, and there are lots of useful printing options, but this personal information manager displays a few rough edges, such as not allowing you to copy the information in the Record Summary field. Aug 92

PRESENTATION TOOLS

★★★★ **Action 1.0, Macromedia, 415/252-2000, \$495.** Entry-level multimedia integration program offers, for its price, a rich selection of features, including an excellent variety of transitions as well as gradient and patterned backgrounds. It makes producing presentations with sound and motion surprisingly easy. Feb 93

★★★★ **Adobe Premiere 2.0 (2.0.1), Adobe Systems, 415/961-4400, \$495.** A dream command post for video professionals, this QuickTime movie-editing software produces stunning special effects with little effort. Only the program's appetite for memory, disk space, and computer horsepower prevent it from being the nonprofessional's dream as well. Jan 93

■ **Aldus Persuasion 2.1 (2.12), Aldus Corp., 206/628-2320, \$495.** For slide presentations, this product provides an all-in-one studio where each element—outline entries, slides, notes, handouts, and charts—is dynamically linked to the others. It offers layered builds and automated templates, and has a proven track record.

★★★★ **Animation Clips 1.0, Media In Motion, 415/621-0707, \$99.** Spice up a presentation with an animated stapler, a jukebox that's a work of art, or any of 58 other customizable animations from these business-oriented packages. Marred only by some choppiness and a few lesser-quality animations. Jun 92

★★★★ **CameraMan 1.0 (1.1), Vision Software International, 408/748-8411, \$149.** If you need to record continuous screen operations, this screen recorder is the best deal around. It handles 32-bit QuickDraw, takes advantage of QuickTime's long list of compression and playback capabilities, and even uses custom frame sizes. Sep 92

continues

Star Ratings

★★★ **Cinematic 1.0, Vividus Corp., 415/494-2111, \$495.** Easy-to-use program merges animation, interactivity, and presentation features, but the image- and text-handling capabilities are less than stellar. Jul 92

★★★ **DIVA VideoShop 1.0, DiVA Corp., 617/491-4147, \$599.** Instantaneous playback sets this graceful QuickTime editing software apart. Its simple beauty is slightly offset by a few rough edges, a lousy manual, and an occasionally clumsy interface. Jul 92

■ **HyperCard 2.1, Claris Corp., 408/727-8227, \$199.** Ease of use has made this multimedia-authoring software a tool for the masses. Although color is awkwardly implemented, more add-on products have been developed for this than for any other multimedia program.

★★★ **MacroMind Director 3.1, Macromedia, 415/252-2000, \$1195.** This minor update to a powerful and versatile multimedia authoring tool adds 23 scripting commands, QuickTime importing and editing, and a utility that compiles movies into a faster playback format—but the whopping \$149 addition to the price makes it an upgrade most users can afford to miss. Feb 93

★★★ **Magic 1.0 (1.1), Macromedia, 415/252-2000, \$395.** Outstanding editing features make this multimedia-presentation software easy to master. Many of the features of more-complex programs are missing, but what it does, it does well. Aug 92

★★★ **Media-Pedia Video Clips, Media-Pedia, 617/235-5617, VHS \$195; S-VHS, Hi8, and 3/4SP \$295; BetaCamSP \$495.** Fifty-seven minutes of stock footage for use in QuickTime movies includes over 150 different segments, ranging from unremarkable to dramatic to genuinely funny. Apr 93

★★★★ **Microsoft PowerPoint 3.0, Microsoft, 206/882-8080, \$495.** This remarkable upgrade puts this presentation program ahead of the pack in terms of convenience and ease of use. Although the ready-made template collection is pretty paltry, the extensive system of master layers, reliable cross-platform compatibility, and strong on-screen presentation capabilities more than compensate. Feb 93

★★★ **Morph 1.0, Gryphon Software Corp., 619/454-6836, \$149.** With patience and practice, you can become a high-tech special-effects wizard using this image-melding movie utility that "melts" one image into another. While using it is simplicity itself, you can only morph still images, and the program suffers from some first-release glitches. Nov 92

★★ **Motion Works ProMotion 1.0 (1.02), Motion Works, 604/685-9975, \$395.** Inexpensive animation program consolidates a slew of tempting features, including flexible path tools and ambitious support for Apple events, but the capabilities are strung together with a weak and problem-ridden interface. Nov 92

★★★ **Passport Producer 1.0, Passport Designs, 415/726-0280, \$495.** Strong timing controls and good sound capabilities mix with middling text- and image-handling and a lack of even basic animation options in this partially successful entry-level multimedia program. Apr 93

★★★ **Special Delivery 1.0, Interactive Media Corp., 415/948-0745, \$399.** While this entry-level multimedia package has all the tools you need to assemble interactive screen presentations that burst with motion and sound, it has a disorienting interface and lacks

the polish and power of other similarly priced programs. Mar 93

PROGRAMMING

★★★ **EdScheme 3.4, Schemers, 305/776-7376, \$49.95.** This clear, elegant programming language is an excellent tool for learning good programming techniques, although it can't be used to create stand-alone applications. Nov 92

★★★ **MetaDesign for the Macintosh 3.0, Meta Software Corp., 617/576-6920, \$250.** This diagramming tool for structured systems analysis offers easy ways to group and ungroup symbols in diagrams and to show relationships between symbols. It excels at austere, classic flowcharts but could use some flashier features, such as shaded backgrounds, for presentations. Mar 93

★★★★ **Object Master 1.0.2, ACI US, 408/252-4444, \$395.** Successful combination of the superior object-management facilities typically found in Smalltalk as well as a first-rate programmer's editor. Plus it works with the most popular languages: C, C++, and Pascal. Jan 93

★★★★ **Prograph 2.5, TGS Systems, 902/455-4446, \$495.** Elegantly designed, object-oriented development environment simplifies Macintosh programming. The graphics-based program is conceptually more advanced than traditional object-oriented programming. Jun 92

★★★ **Serius Programmer 3.0, Serius Corp., 801/261-7900, \$395.** The graphical interface of this application-design environment provides nonprogrammers with tools for creating custom software, but the documentation lacks critical explanations. Jan 93

★★★★ **Think C 5.0, Symantec Corp., 408/253-9600, \$299.** Although not a radical improvement, this is a significant upgrade to an outstanding development tool. Beginners will not find the documentation helpful. Jul 92

★★★★ **Think Pascal 4.0, Symantec Corp., 408/252-3570, \$249.** A remarkable achievement—a programming language and environment full-bodied enough for professional programmers while still inviting for neophytes. No weak points and dozens of strengths. Aug 92

★★★★ **UserLand Frontier 1.0 (2.0), UserLand Software, 415/369-6600, \$249.** A robust scripting language distinguishes this ground-breaking desktop programming tool that can automate desktop functions, repetitive data-managements tasks, and more. Scripts can only be used on computers with copies of the program. Jul 92

UTILITIES

■ **After Dark 2.0, Berkeley Systems, 510/540-5536, \$49.95.** Turn your screen into an aquarium or a view of a night skyline with this whimsical screen saver that includes more than 30 different modules.

★★★ **ALSoft Power Utilities 1.0.1 (1.0.2), ALSoft, 713/353-4090, \$129.95.** Buying this set of seven utilities is more economical than purchasing the included disk optimizer and resource manager (DiskExpress II and MasterJuggler) separately, but the other five utilities are unimpressive. Aug 92

★★★★ **At Ease, Apple Computer, 408/996-1010, \$59.** Sweet, simple, secure substitute for the Finder displays a clean, attractive page full of oversize icons where

a single click launches a program or document. To delete, rename, or move files, you have to return to the Finder. Mar 93

★★★ **AutoDoubler 1.0.7 (2.0), Salient Software, 415/321-5375, \$79.95.** Designed to operate transparently, this automatic file-compression utility is a practical solution for users short on disk space, but it's missing many of the features of dedicated file-compression utilities, and it provides only limited control over the process. Sep 92

★★★★ **BetterWriters 1.0.1 (1.0.3), GDT Software, 604/291-9121, \$69.** Smart drivers teach your ImageWriter, StyleWriter, or DeskWriter laser printer tricks, letting it perform printing gymnastics such as inverting images and adding a variety of options for improving output. Minor incompatibilities with some common applications are inconvenient. Jul 92

★★★★ **Citadel with Shredder 1.0 (1.1), Microcom, 919/490-1277, \$149.95.** Simple, convenient set of system-security tools covers all the bases, including password protection, encryption, permanent erasure, and more. Jun 92

★★★★ **Conflict Catcher and Other Innovative Utilities 1.0, Casady & Greene, 408/484-9228, \$79.95.** Enable or disable your INITs and start-up items when you boot-up, with this INIT manager that comes with four other system-related utilities. Its ability to track down INIT-related problems makes it a worthwhile investment even if you already have another INIT manager. Mar 93

★★★★ **Copyright, CSG Technologies, 412/471-7170, \$49.** If you can justify spending \$49 purely for the sake of efficiency, this straightforward utility replaces the Finder's copy function, unobtrusively copying files to or from your Mac, in the background, while you move on to more interesting things. Apr 93

★★★ **CPU 1.0j, Connectix Corp., 415/571-5100, \$99.** Indispensable items mix with trivial ones in this collection of utilities for the PowerBook. It's a relatively inexpensive way to turn any PowerBook owner into a full-fledged power user. Apr 93

★★ **Crash Barrier 1.0.1 (1.1), Casady & Greene, 408/484-9228, \$79.95.** Control panel device is supposed to intervene during system crashes. It's a great idea, but it only works for certain types of crashes. Apr 92

■ **DiskDoubler 3.7 (3.76), Salient Software, 415/321-5375, \$79.95.** With its impressive safety features, extremely tight compression, and respectable speed, this file-compression utility is a must-have for anyone who could use more hard drive space.

★★★ **DiskFit Pro 1.0 (1.1), Dantz Development Corp., 510/849-0293, \$125.** Effective backup utility requires a time- and disk-consuming initial full backup, but subsequent incremental backups are simple and speedy. It does not support tape drives. Apr 92

★★★ **Drive 7 2.3, Casa Blanca Works, 415/461-2227, \$79.95.** Universal hard drive updater and formatter has an attractive, uncluttered interface that's so easy to use it makes hard drive maintenance almost relaxing. Jan 93

★★★★ **easyPrint 1.0, SF/O, 402/291-0113, \$29.95.** Nifty utility lets you switch printers without using the Chooser. It's a bargain for network users and those who frequently change output devices. Oct 92

❑ **Exposure Pro 1.0.2 (1.02), Baseline Publishing, 901/682-9676, \$139.95.** A floating palette in this screen-capture utility lets you edit your screen shots before you save them. It's a clever idea for those who don't own a paint program, but it creates only 72-dpi bitmaps.

★★★★ **Fastback Plus 2.6 (3.0), Fifth Generation Systems, 504/291-7221, \$189.** Even the most hardened shirker should be inspired to back up by the marvelously simple interface of this software. One warning—memory shortages can cause it to quit unexpectedly when running in the background. Apr 92

★★★★ **FolderBolt 1.02 (1.02c), Kent Marsh, 713/522-5625, \$129.95.** Three designated levels of folder protection, plus flexible options for password-handling, among other actions, are the assets of this utility. File encryption, however, is not included. Jun 92

★★ **Gofer 2.0, Microlytics, 716/248-9150, \$79.95.** Poky processing time is the trade-off for flexible text-search options without indexing by this file-finding utility. Our reviewer vetoed the trade. Jun 92

★★★★ **HAM 1.0, Microseeds Publishing, 203/435-4995, \$79.95.** Apple-menu enhancer adds submenus, allows reordering, and includes a folder of recently opened items in your Apple menu. Apr 92

★★★★ **Hard Disk Toolkit Personal Edition 1.1.2, FWB Software, 415/474-8055, \$79.** The more arcane features of the heavy-duty Hard Disk Toolkit have been stripped out of this entry-level, non-power-user version, but everything you really need to format, update, partition, and manage your hard drive is still included in the Personal Edition. Jan 93

★★★★ **INITPicker 3.0, Inline Design, 203/435-4995, \$79.95.** This INIT manager's ability to load aliased INITs over a network will interest network managers. While it disables problem INITs at start-up, it doesn't help you identify the cause of INIT conflicts that don't cause the Mac to crash at start-up. Mar 93

★★★★ **Inline Sync 1.0, Inline Design, 203/435-4995, \$129.95.** Keep the latest version of your work on both your portable machine and your desktop Mac with this file-synchronization software. It's easy to install, easy to use, easy on the wallet, and it does the job well. Mar 93

★★★★ **Kiwi Power Menus 1.0, Kiwi Software, 805/685-4031, \$39.95.** Simple little utility adds flexibility to the Apple menu by adding an unlimited number of submenus and enabling you to change the font and size in the menus. Dec 92

★★★★ **Kiwi Power Windows 1.5 (1.5.2), Kiwi Software, 805/685-4031, \$79.95.** Our skeptical reviewer found this system extension surprisingly handy. Its hierarchical menu lists all the open windows in the Finder and any applications. Jul 92

★★★★ **MacPalette II 2.2, Microspot USA, 408/253-2000, \$69.** You can print images from 8-bit and 24-bit color programs when you use an ImageWriter II with a four-color ribbon and this new driver that approximates halftones by dithering. While the results are less than state-of-the-art, so is the cost. Sep 92

★★★★ **MacTools 2.0, Central Point Software, 503/690-8090, \$149.** The consistent, 3-D-style interface makes it easy for the inexperienced user to navigate this utility package; the automated hard drive and floppy-disk repair capabilities and antivirus capabilities make it an asset for anyone. Oct 92

★★★★ **Magnet 1.0, No Hands Software, 415/321-7340, \$129.95.** Automation aids the laborious task of file management with this software. It creates "agents" or "magnets" that trigger in response to user-specified events and automatically look for files and folders to copy, move, or alias. Feb 93

★★★★ **MasterFinder 1.2.1, Olduvai Corp., 305/670-1112, \$149.** Ingenious finder utility provides rapid access to frequently used files and folders, permits operations on several files at once, and saves catalogs of offline volumes, but the many features require some effort to learn. Nov 92

★★★★ **More Disk Space 1.1 (1.2), Alysis Software Corp., 415/566-2263, \$39.95.** Automatically compress and expand files with this utility. Although it doesn't identify compressed files, and must run as a start-up application to work automatically, it does offer a measure of control that similar utilities lack. Sep 92

★★★★ **NightWatch II 2.0.1b, Kent Marsh, 713/522-5625, \$159.95.** Although skillful snoops can override the screen-locker feature of this hard drive security utility, the password protection provides a flexible and safe method of restricting access to anyone turning on your hard drive. Nov 92

★★★★ **Nok Nok 1.0 (1.0.3), Trik, 617/933-8810, \$49.95.** Plug the security holes that System 7 file sharing created, with this effective file-share monitoring utility that logs people's attempts to connect to your Mac, alerts you when someone does connect, and sets time limits for file share users. Oct 92

★★★★ **Norton Essentials for PowerBook 1.0, Symantec Corp., 310/453-4600, \$129.** Uneven collection of a dozen PowerBook utilities ranges from the unique and useful Instant Access module, which automatically turns AppleTalk on and off, to the relatively inaccurate Battery Gauge feature, which purports to tell you the status of your battery. Apr 93

★★★★ **Norton Utilities for Macintosh 2.0, Symantec Corp., 310/453-4600, \$149.** Everything—including the kitchen-sink utility package does an excellent job of diagnosing and repairing damaged hard drives and floppy disks, but the interfaces of the various components differ wildly. Oct 92

❑ **Now Utilities 3.0.2 (4.0.1), Now Software, 503/274-2800, \$149.** Despite minor imperfections, this collection of utilities, including ten separate programs and a variety of sample and support files, provides lots of highly polished bang for your buck.

★★★★ **On Location 2.0.1, On Technology, 617/876-0900, \$129.95.** Fast file-finding utility with improved functionality shows formatted files, and updates index in background. Alas, the initial indexing is time-consuming, and the search functions are incomplete. Jun 92

★★★★ **PicturePress 2.5, Storm Technology, 415/691-6600, \$199.** This image-compression software supports every useful storage mode; has new calculation features for improved image fidelity; offers utilities with practical advantages for day-to-day graphics work; and is twice as fast as version 2.0. If you work with images professionally, it's the clear choice. Mar 93

★★★★ **PowerMerge 1.0.2, Leader Technologies, 714/757-1787, \$129.** File-synchronization utility has a potentially confusing interface, but is a handy means of updating selected files so that different Macs end up with identical versions of the selected documents. Apr 93

★★★★ **Retrieve It 1.0, MVP Software, 415/599-2704, \$129.** It's great that this nonindexed file-finding utility allows you to search by file name as well as by text, but it is definitely slower than indexed searching. Nov 92

★★★★ **Shredder 1.0.1, DLM Software, 619/453-4984, \$69.** Permanently blitz your data with this quick and easy trash-management tool that writes over deleted data—in accordance with Department of Defense specifications—so that file-restoration programs can't bring it back. Jul 92

★★★★ **Silverlining 5.4, La Cie, 800/999-3919, \$149.** Extensive and detailed testing is only one of many advanced functions offered by this hard drive-management utility. The interface is lackluster and apt to confuse beginners. Jan 93

★★★★ **SnapBack 1.0, Golden Triangle Computers, 619/279-2100, \$129.** For regular day-to-day backups, this network backup software is a great choice. Its strength lies in its simplicity and its easy-to-use, one-window interface, but it requires a dedicated hard drive. Dec 92

★★★★ **SpeedyCD 1.2.2 (1.2.4), ShirtPocket Software, 602/966-7667, \$70.** Get Info gets faster with this CD ROM-access accelerator that creates a database of files from a CD and puts it on your hard drive. If you regularly browse through the same CD ROM folders, this product might save you enough time for it to be worth the \$70. Nov 92

★★★★ **Super 7 Utilities, Atticus Software, 203/324-1142, \$99.95.** Collection of seven control panels/extensions adds some ease of use to System 7, although none of its functions are essential. Modules perform tricks such as turning any menu into a tear-off palette, and randomizing the sounds that play in response to errors. Apr 93

★★ **SuperDuper 1.7, NeoConcepts, 408/899-4821, \$79.** If you're sick of duplicating disks with the Finder, this utility is an acceptable alternative, but there are other utilities that are better, cheaper, and do the same thing. Nov 92

❑ **Symantec Antivirus for the Mac (SAM) (3.0.9), Symantec, 408/253-9600, \$99.** No-holds-barred virus fighter monitors your Mac and alerts you when it sees suspicious activity. Advanced users and network managers will appreciate its customization features and extensive scanning options.

★★★★ **TimeLog 1.01 (1.02), Coral Research, 702/831-9346, \$97.** Even jaded computer users will approve of the reporting options offered by this utility for recording program-usage information. No network features included. Jul 92

★★★★ **UpDiff 1.0, KyZen Corp., 609/354-3863, \$169.** Innovative program compares two versions of a file, extracts the differences, and creates a difference file that is typically smaller than the original and can be used to update the older file. Dec 92

★★★★ **Voice Navigator SW 2.3, Articulate Systems, 617/935-5656, \$399.** Talk back to your Mac (if it has built-in sound input) with this speech-recognition software. Defining macros that respond to voice commands can be frustrating, but the product is a real boon for disabled users. Jan 93

★★★★ **Wallpaper 1.0.1 (1.0.2), Thought I Could, 212/673-9724, \$59.99.** Terrific control panel continues

Star Ratings

device lets you design, edit, import, and display repeating patterns on your Mac's desktop. Comes with fun, creative predesigned patterns. May 92

★★★ **WindoWatch 1.52 (1.53), ASD Software, 714/624-2594, \$149.** If your primary concern is to track program and file use, this utility will handle the job nicely. Using it for the purpose of time billing with numerous programs, however, may be a maintenance nightmare. Jul 92

★★★ **WonderPrint 1.0, Delta Tao Software, 408/730-9336, \$59.** StyleWriters and DeskWriters produce halftones good enough for newsletters with this printing extension that improves the output of QuickDraw printers and accelerates printing of pictures on PostScript printers. Jan 93

★★ **Workspace 1.0, Ark Interface, 206/654-4127, \$149.** Although this novel desktop replacement is an intriguing first step toward improving the Finder, not enough functionality was added to satisfy our reviewer. Jul 92

★★★ **Zephyr Palettes for PageMaker, Zephyr Palettes for FreeHand 1.0.2 (1.3), Zephyr Design, 206/324-0292, \$79.95.** Exchange pull-down menus for palettes in PageMaker or FreeHand with these cleverly conceived, modestly priced utilities. A number of details could still be smoothed, but none are real stumbling blocks. Jul 92

VERTICAL MARKETS

★★★ **Compare-A-Loan 4.0.2, Softflair, 612/894-3357, \$79.95.** Although geared to professionals, this product for home-loan evaluation provides thorough documentation and is structured so that anyone can use it. Its reports compare payback schedules of various home-loan options. Apr 93

★★ **ConstructionMac 1.2 (2.0), Revelar Software, 801/485-3291, \$99.** With a lot of work from you, this software will organize your construction or remodeling project. Oct 92

★★ **The Desktop Lawyer, The Open University, 407/649-8488, \$99.95.** The manual included with this collection of more than 300 legal-document templates provides an excellent overview of legal concepts; too bad the directions for filling out the forms are so unclear. Apr 92

★★★★ **Diet Balancer 1.0, Nutridata Software Corp., 914/298-1308, \$69.95.** Easy-to-use personalized weight-planning tool includes a database of nutritional values and standard serving sizes, and is useful for home diet-planning. Dec 92

★★ **Expert Landscape Design, Expert Software, 305/567-9990, \$49.95.** Bare-bones drawing environment for experimenting with landscape design is inexpensive, but its usefulness is severely limited because of awkward color and pattern tools and because it doesn't identify plant types. Feb 93

★★★★ **Grade Machine 5.0, Misty City Software, 800/795-0049, \$79.** Teachers' lives get easier with this software that quickly sets up a useful electronic grade book. Program includes networking capabilities plus dozens of options for printing reports. Dec 92

★★★ **JobTracker 2.02, InfoSolutions, 814/355-2983, \$395 to \$844.** Designed specifically for publication management, this scheduling and project-man-

agement software isn't completely polished, but it manages the job competently. Dec 92

★★★ **Legal LetterWorks 1.0, Round Lake Publishing, 203/438-1048, \$79.95.** Any word processor can open the 165 legal-document templates included in this collection, and the modular form design is relatively versatile. Apr 92

★★★ **LoanLease Library 3.0.3, Softflair, 612/894-3357, \$79.95.** If you are generating a loan or a lease and need to keep track of payments, this well-documented program for loan evaluation is a worthwhile investment, despite its minor eccentricities. Apr 93

★★★ **Making the Grade 2.0, Jay Klein Productions, 719/591-9815, \$99.95.** The Macintosh version of the Apple II program Grade Busters 1/2/3, this grade-book software with dozens of reporting options is easy to learn; but if you're already spreadsheet-literate, the friendly dialog boxes and reminders may get in the way. Dec 92

★★★★ **Nolo's Living Trust 1.0, Nolo Press, 510/549-1976, \$79.95.** Gracefully guiding users through the process of drafting a living trust, this product is carefully thought out and a great value for simple trusts. Aug 92

★★★ **Nutri-Calc Plus 1.2, Camde Corp., 602/926-2632, \$225.** Designed for knowledgeable and serious users, this powerful, flexible program manages nutrition information and analyzes diets. Dec 92

★★★ **Stat-Ref 3.2a, Teton Data Systems, 307/733-9258, \$95.** Medical database on CD ROM lets you search by keyword. Because it provides access to limited sets of journal citations, it's not suitable for research, but it could effectively replace a small reference library in an office. Jan 93

WRITING TOOLS

★★ **Correct Grammar 3.0 (3.01), Wordstar International, 415/382-8000, \$99.** Illogical and inappropriate recommendations are a hallmark of all grammar checkers, but this one also violates Mac conventions in irritating ways. Aug 92

★★★ **Correct Letters 1.1 (1.0), Wordstar International, 415/382-8000, \$49.** In addition to more than 250 ready-made business letters, this HyperCard-based product boasts an excellent online Guide to Letter Writing. The disabled Find command is mystifying and inconvenient. Jul 92

★★ **Correct Writing 2.0, Wordstar International, 415/382-8000, \$49.** For those who are unsure of the elements of style, this online reference is convenient and comparatively inexpensive, but it is far from complete. Sep 92

★★★★ **DocuComp II 1.0 (1.03), Advanced Software, 408/733-0745, \$179.95.** Document-management utility compares text in two versions of the same file and reports the differences in a comprehensive, easy-to-follow format. Nov 92

★★★★ **EndNote Plus 1.2 (1.2.1), Niles and Associates, 510/649-8176, \$249.** Reference database and tool for creating citations and bibliographies is now accessible from within Microsoft Word 5.0, representing a significant enhancement to this excellent product. Sep 92

★★★★ **Final Draft 2.0, MacToolkit, 310/395-**

4242, \$349. Script-writing gets simpler with this well-conceived software that automates formatting of different elements in a script, including dialogue, action, and slug lines (scene headings). Customization is easy, and macros automate typing of common phrases such as "fade to black." Apr 93

★★★ **IdeaFisher 2.0, Fisher Idea Systems, 714/474-8111, \$595.** Inspiration never comes easily, but this creativity tool with a question bank of 6000 questions and an idea bank of 61,000 words and 700,000 links might help get the juices flowing. Jan 93

★★★ **Just Joking 1.0, WordStar International, 415/382-8000, \$49.** HyperCard stack of around 2800 humorous quotations offers a serviceable selection of sayings from a diverse group of humorists, comedians, philosophers, and writers, among others. Apr 93

★★★ **LetterPerfect for Macintosh 2.1, WordPerfect Corp., 801/225-5000, \$149.** Stripped-down version of WordPerfect measures up as a serviceable low-end word processor, with clean, accurate documentation and an uncluttered interface. Jan 93

★★★★ **Microsoft Word 5.1, Microsoft, 206/882-8080, \$495.** Small, solid upgrade fine-tunes some plug-in modules and adds new modules including an icon tool bar, text annotation, and other features. The numerous minor enhancements make it worth the upgrade price, but it's not likely to give Word 5.0 users goosebumps. Mar 93

★★ **Nisus Compact 3.3 (3.31), Nisus Software, 619/481-1477, \$150.** Inexpensive price and low disk-space requirements don't compensate for this word processor's many missing features, including mail merge, macros, and word count. Memory quirks are an additional problem. Aug 92

★★★★ **Plots Unlimited 1.04, Ashleywilde, 310/456-1277, \$399.** Peter loves Allison but she has a breakdown when he confesses to murder. Or maybe not. This writing tool's database contains 5600 plot twists, all linked. The interface is imperfect, leaving items in bold when they should be grayed out, and it requires too much mousing. Jul 92

★★★★ **Pro-Cite 2.0, Personal Bibliographic Software, 313/996-1580, \$395.** Valuable bibliographic database program generates large, complex bibliographies. Some features aren't easy to use, but it does have 20 predefined and 6 user-defined forms, plus flexible sorting options. Jun 92

★★★ **RightWriter for the Mac 5.0, Que Software, 317/573-2500, \$99.95.** Grammar checker looks at writing style, word usage, punctuation, and capitalization, as well as grammar. Customizable writing-style filters and multiple approaches to analysis are nice, but—as with all grammar checkers—following all of the program's advice is likely to hurt, not help, your writing. May 93

★★★★ **ShowScape 4.1, Lake Compuframes, 914/941-1998, \$429, with WordPerfect 2.0 \$679.** This script-writing software formats scripts in either screenplay format or dual-column format (for audio and video) and allows you to choose the number of shots displayed per page, but it requires you to own and work in WordPerfect. Apr 93

★ **StoryLine 1.02 (1.4), Truby's Writers Studio, 310/575-3050, \$345.** Frustrating and sometimes haphazard HyperCard-based program attempts to offer expert training in the craft of plot development. Aug 92

★★ **Taste 1.02 (1.02c), DeltaPoint, 408/648-4000, \$149.** The page-view, WYSIWYG orientation of this word processor with page-layout features makes it considerably slower than text-oriented word processors. Redraw and translator bugs are other problems. May 92

★★★ **Thunder 7 1.0.5 (1.5), Baseline Publishing, 901/682-9676, \$99.95.** The speed, customizing options, and overall feature-set of this stand-alone spelling checker and thesaurus are admirable, but before you can trust it implicitly, it needs a dictionary with greater integrity. Jul 92

★★★ **TypeReader 1.0, ExperVision, 408/428-9988, \$695.** Speed and accuracy combine with a straightforward operating style in this high-end optical character-recognition software that doesn't do everything its competition does, but is a major contender nonetheless. Feb 93

★★★ **VersionMaster 1.5, AStar Technologies, 508/486-8532, \$199.95, five users \$799.95, ten users \$1199.95.** Document-management utility helps you archive and track versions of a file by maintaining a database of altered documents. It's recommended only for workgroups that routinely follow check-out procedures and that don't need detailed reports of the changes to a file. Apr 93

★★★ **WordPerfect for Macintosh 2.1 (2.1.2), WordPerfect Corp., 801/225-5000, \$495.** Play QuickTime movies in your text files or publish and subscribe with this upgrade. It continues to provide the best desktop publishing and graphics capabilities of any word processor, but it lacks glossary- and table-creation features. Jun 92

★★★ **WordScan, WordScan Plus 1.0 (1.01), Calera Recognition Systems, 408/720-8300, \$295, \$595.** The idiosyncratic interface of these two OCR programs is only a minor inconvenience considering their relative accuracy and speed. Jun 92

★★★★ **WriteNow 3.0, T/Maker Company, 415/962-0195, \$249.** The streamlined approach of this low-end word processor will appeal to many Macintosh users, especially the storage-conscious. A nice mix of features includes impressive implementation of style sheets. Sep 92

Hardware

INPUT DEVICES

★★★★ **A³ Mouse, Mouse Systems Corp., 510/656-1117, \$134.95.** A smooth ride and tight resolution characterize this optical device with three light-touch keys. Stronger software would have made it a more attractive package; the software's incompatibilities and limitations are a problem. Jun 92

★★★ **Acecat for Macintosh, AceCAD, 408/655-1900, \$149.** It's the hands-down winner in the digitizing-tablet price competition, but although this product works well, it lacks some of the amenities of higher-end tablets. Aug 92

★★★★ **The Bat, Infogrip, 504/766-8082, \$495.** Right- and left-hand keypads slant the little fingers down and the thumbs up, with built-in wrist rests. Our reviewer considered it the best ergonomic device she'd seen; the downside is learning to type all over again. Oct 92

★★★ **DrawingBoard II, Drawing Pad, CalComp, 800/932-1212, \$645, \$395.** Two lik-

able features of these digitizing tablets are the transparent, hinged cover for securing artwork, and a menu strip with buttons for changing drawing modes and accessing macros. Stylus problems and CalComp's haphazard tech support are drawbacks. Jul 92

★★★ **Mouse-Trak, Itac Systems, 214/494-3073, \$179.** Well-positioned, easy-to-rotate trackball with a soft wrist-pad is comfortable to use, but must be disassembled to reconfigure the buttons. Nov 92

★★★ **MouseMan, Logitech, 510/795-8500, \$129.** Bear-paw-shape mouse with three programmable buttons is handsome and solidly made. It may be too big for some hands. Jun 92

★★★ **TrackMan, Logitech, 510/795-8500, \$149.** There's a right-hand bias to this trackball with three programmable buttons and a handy click-lock feature. Jun 92

★★★★ **Turbo Mouse 4.0, Kensington Micro-ware, 415/572-2700, \$169.95.** The large buttons on either side of this trackball provide just the right measure of tactile feedback while the removable ball glides freely. The breakthrough feature, though, is the software that lets you customize many of the trackball's functions. Nov 92

★★★ **The UnMouse, Microtouch Systems, 508/694-9900, \$199.** Input device is a cursor control device, programmable keypad, and small graphics tablet in one, and can be programmed with 60 macros (although only 16 can be selected by sight). It's ergonomically better than a mouse, but not as good as a trackball. May 93

★★★ **Voice Express, MacSema, 503/757-1520, \$399.** Voice-recognition board lets you record words or phrases that trigger simple key sequences, but commands are limited to those with keyboard equivalents, and the system is weighed down by several quirky features. Apr 92

★★★ **Voice Navigator II, Articulate Systems, 617/935-5656, \$699.** Stand-alone SCSI device offers an impressive, full-featured set of tools for voice control of your Mac, but mastering them takes time and effort. Apr 92

★★★ **Z-Nix Cordless SuperMouse, Z-Nix, 714/629-8050, \$99.** Sleek and attractive cordless mouse works reliably and is attractively priced, but suffers from the same line-of-sight limitations as other infrared devices (such as TV remote controls). Dec 92

MISCELLANEOUS HARDWARE

★★★ **ACS300 Computer Speaker System, Altec Lansing Consumer Products, 717/296-4434, \$400.** Clamshell-shape high/midrange speakers come with a freestanding subwoofer and power supply. The sound is rich and smooth, but the cabling is nonstandard, and there is no on/off switch. Nov 92

★★★ **Bose RoomMate speakers, Bose Corp., 508/879-7330, \$329.** Shielded stereo speakers with a rich, bassy sound can double as regular stereo speakers. Unfortunately, they're heavy, expensive, and the highs are muddy. Jun 92

★★★ **MacSpeaker MS-1, Monster Cable, 415/871-6000, \$229.95.** Crystal-clear highs and a meaty midrange are the best features of these shielded stereo speakers. They're beautifully designed for close-up listening, but the bass sounds wimpy. Jun 92

★★★★ **Media Control Station, JLCoeper Elec-**

tronics, 310/306-4131, \$269.95. This versatile tool connects to the Mac through an ADB port and offers an easy and intuitive way to cue and edit QuickTime movies, MIDI files, multimedia playlists, and other dynamic data. Feb 93

★★★★ **The Miracle Piano Teaching System 1.0, Software Toolworks, 415/883-3000, \$499.95.** Painstakingly crafted music and piano instructor comes with keyboard, software, and 120 songs, including classical, movie-theme, and rock. The program offers encouragement and advice, and ends every lesson with a synthesized orchestra accompaniment. Oct 92

★★★★ **The Mouse Yoke, Colorado Spectrum, 303/225-6929, \$34.95.** Gadget turns an ordinary mechanical mouse into an aircraft-style steering wheel, or yoke, for use with flight simulators. Simple, elegantly executed concept uses quality materials; device is not appropriate for driving simulations or shooting games. Dec 92

★★★★ **Organizer Link II (Model OZ-893), Sharp Corp., 800/321-8877, \$129.99.** If you own a 5000-, 7000-, or 8000- series Sharp Wizard, this program and cable allow you to connect it to a Mac serial port to exchange data. It's functional, but does have some minor weaknesses. Jan 93

★★★ **PhonePro 1.0.3 (1.1), Cypress Research Corp., 408/752-2700, \$950.** Application makes it relatively easy to develop a multiple-choice voice-mail system using your Mac, especially for those with programming backgrounds. The product includes a 9600-bps modem and a headset/microphone. Feb 93

★★★★ **PowerKey 2.0, Sophisticated Circuits, 206/485-7979, \$119.** Ingenious, well-designed automated power strip has four surge-protected outlets that are controlled by the keyboard's on/off switch. The equally clever software can turn on your Mac, unattended, run a QuickKeys macro (QuickKeys Lite included), and shut down again. Dec 92

★★★★ **Ringo LM, MacSema, 503/757-1520, \$189.95.** If your sole phone-line is doing double duty as a fax and voice line, this telephone-line manager is the answer to your prayers. May 92

★★★ **Yamaha TG100, Yamaha Corp. of America, 714/522-9011, \$449.** Compact, keyboardless, multitimbral MIDI synthesizer with built-in MIDI interface adheres to the life-simplifying General MIDI standard patch arrangement. Although it won't convince you that you're hearing a live orchestra, the sound is about as realistic as low-cost MIDI gets. Apr 93

MODEMS/NETWORK HARDWARE

★★★★ **Comstation 2, PSI Integration, 408/559-8544, \$399.** Unusually well designed software accompanies this fax/data modem. The simple, straightforward interface and handy QuickFax DA are positives; uninformative error messages are minor negatives. Jun 92

★★★ **Comstation 4, PSI Integration, 408/559-8544, \$499.** An otherwise solid fax/data modem for network use is hurt by an awkward process for distributing faxes, plus the need for a separate file server and fax server. Jun 92

★★ **EtherPrint, Dayna Communications, 801/531-0600, \$499.** It's possible to connect a single LocalTalk printer to an Ethernet network using this device, but continues

Star Ratings

it's an expensive option. Dec 92

★★★★ **EtherPrint Plus, Dayna Communications, 801/531-0600, \$649.** Support four LocalTalk products on an Ethernet network using this device that can also serve as an inexpensive AppleTalk router. Dec 92

★★★★ **EtherWrite, Compatible Systems Corp., 303/444-9532, \$695.** Elegant and cost-effective device with excellent network-management software allows up to six LocalTalk products to connect to an Ethernet network. Dec 92

★★★★ **PathFinder, Dayna Communications, 801/531-0600, \$899.** For simple networks, this LocalTalk-to-Ethernet router is a great value, as well as a great time-saver for beginning network managers. It uses AppleTalk only. Jan 93

★★★★ **PowerModem, PSI Integration, 408/559-8544, \$299.** Superior fax software distinguishes this fax/data modem for PowerBooks, but it's not the best choice for those who do a lot of online work that requires a high-speed data modem. Jul 92

★★★★ **PowerPort/Gold, Global Village Communications, 415/329-0700, \$499.** If you need 14,400-bps throughput, this data/fax modem is a champ. Its improved software and packaging raise the standards for PowerBook modems. Dec 92

★★★★ **QBlazer, Telebit Corp., 408/734-4333, \$599.** If portability is an important issue, this 9600-bps modem's pint size and battery power make it an attractive choice; otherwise, its high price plus the lack of Mac software and send-fax features work against it. May 92

★★★★ **QuickTel Xeba 9600, Logicode Technology, 805/499-4443, \$319.** Sleek, slanty, futuristic-looking fax modem offers all the features you'd expect, including acceptable fax software. Apr 92

★★★★ **Sportster 14,400 Fax/Data Modem, U.S. Robotics, 708/982-5001, \$599.** Several nice features, including an easily accessible power button and a front-mounted volume-control dial, make this 100 percent Mac-ready, 14,400-bps fax/data modem better than average. Feb 93

★★★★ **SupraFaxModem V.32bis, Supra Corp., 503/967-2400, \$399.95.** Send and receive faxes and data at speeds up to 14,400 bps with this attractively priced fax/data modem. The software works well; tech support is adequate. Aug 92

★★ **Ultima Home Office, Prometheus Products, 503/692-9600, \$649.** When it can reliably transmit data at high speeds and the voice bugs are fixed, this fax modem with voice mail will be worth a second look. Oct 92

★★ **Viva 14.4/Fax, Computer Peripherals, 805/499-5751, \$469.** In data mode, this 14,400-bps fax/data modem performed well, but the software bundled with it is barely adequate. Jan 93

★★ **WorldPort 9600 MNP5, U.S. Robotics, 708/982-5001, \$475.** Only slightly larger than a deck of cards, this 9600-bps modem is geared toward PC users, with a user guide that never mentions Macs and software that is only for PC compatibles. Jan 93

PRINTERS

★★ **C. Itoh ProWriter Printer, C-Tech Electronics, 714/833-1165, \$2395.** Not only is this laser printer more expensive than most personal page print-

ers, it also offers less-impressive features and so-so output. Nov 92

★★★★ **DEClaser 1152, Digital Equipment Corp., 508/493-5111, \$1299.** Four-pages-per-minute, 300-dpi, PostScript Level 2 printer offers simultaneous support for Macs and PCs, plus excellent image quality, for a groundbreaking price. The internal font set is small, and the included 2MB of memory is not enough to print complex images. May 93

★★★★ **HP LaserJet 4M, Hewlett-Packard, 800/752-0900, \$2999.** An Intel i8960 RISC processor makes printing complex images faster than ever with this 600-dpi printer, while the Canon LBP-EX print engine and microfine toner guarantee smooth curves and crisp characters. An autoswitch feature makes it a flexible option for mixed-platform offices. Feb 93

★★★★ **HP PaintJet XL300, Hewlett-Packard, 800/752-0900, \$3495.** The output of this color ink-jet printer won't satisfy demanding graphic arts professionals, but it's great for business users interested in punching up their presentations. Oct 92

★★★★ **IBM LaserPrinter 10A, IBM Corp., 800/358-5835, \$3995.** Beautifully defined text, razor-sharp line art, clear gray tones—the output from this large, awkwardly designed, 600-dpi PostScript printer is dazzling, and all for under \$4000. Aug 92

★★★★ **LZR 1560, Dataproducts Corp., 818/887-8000, \$3395.** Tabloid-size 400-dpi laser printer blazed through our standard printer speed tests and produced output noticeably better than that of 300-dpi printers. It's a good choice for a mixed network. Sep 92

★★★★ **LZR 960, Dataproducts Corp., 818/887-8000, \$2195.** This peach of a personal PostScript printer is compact, fast, and produces excellent output. Our reviewer experienced low-memory error messages, but most memory problems should be solved with the current shipping configuration of 3MB of RAM. Jul 92

★★★★ **RasterOps CorrectPrint 300, RasterOps Corp., 408/562-4200, \$8999.** The cost of high-quality, photo-realistic color printing takes a nosedive with this 300-dpi, dye-sublimation printer. The relatively small (8.1 by 8.6 inches on letter-size media) print area is the only significant flaw. Oct 92

★★★★ **RealTech Laser 400, Hardware That Fits, 409/760-2400, \$3195.** Exactly the same tabloid-size, 400-dpi printer as the Dataproducts LZR 1560, but for slightly less money. And it produces output that is perceptibly better than that of 300-dpi printers. Sep 92

★★★★ **StyleWriter, Apple Computer, 408/996-1010, \$399.** If money is tight, if you want nice-looking output, and if you have a little extra time to spare, this is a good personal printer with a new driver that makes it even better. Sep 92

★★★★ **TI microLaser Turbo, Texas Instruments, 800/527-3500, \$2349.** An enhanced version of TI's microLaser Plus, this PostScript Level 2 printer is an admirable performer and a dependable machine, but it leaves you wondering whether the extra \$500 is worth it. Jul 92

★★★★ **WideWriter, GCC Technologies, 617/890-0880, \$1699.** Large-format output comes in a reasonably priced package with this ink-jet printer that can automatically feed sheets as large as 14 by 91 inches or manually feed sheets 17 inches wide with an unlimited length. Feb 93

SCANNERS

★★★★ **HP ScanJet IIP, Hewlett-Packard, 800/752-0900, \$1095.** An elegant piece of technology, this desktop gray-scale scanner produces excellent results for a street price of around \$750. Muddled online help and a flimsy hinge are minor problems. Aug 92

★★★★ **LightningScan Pro 256, Thunderware, 510/254-6581, \$649.** A well-executed hand-held gray-scale scanner worth the cost. It creates 8-bit scans at up to 400 dpi; images scanned in two passes can be joined flawlessly. The only drawback is slow scrolling in software. Jun 92

★★★★ **Mirror 600 Color Scanner, Mirror Technologies, 612/633-4450, \$1199.** Three-pass scanner with 600-dpi vertical and 300-dpi horizontal resolution is fast, precise, and an excellent value. The only liability is its somewhat quirky software. Apr 92

★★★★ **Nikon LS-3510AF Film Scanner, Nikon, 516/547-4355, 8-bit \$9535, 24-bit \$11,316.** The bread-box-style design of this 35mm film scanner may be reminiscent of past models, but many changes make it faster and more convenient. Still, advanced users won't be satisfied with the tools for overriding automatic exposure and tone adjustments. Sep 92

★★ **PageBrush Professional, Mitsubishi International, 415/544-2781, \$795.** A brilliant idea with unfortunate rough spots. Gray-scale, hand-held scanner/mouse scans full-page or larger images and produces 300-dpi gray-scale files, but the process and software are agonizingly slow; the buttons are hypersensitive; and the product is expensive. Jun 92

★★★★ **RasterOps Expresso Personal Slide Scanner, RasterOps Corp., 408/562-4200, \$849.** Essentially a video camera mounted above an illuminated stage, this slide scanner outputs NTSC video. It's fast, convenient, and economical, but falls short for digital images; its best file looks worse than output from a 24-bit flatbed or slide scanner. Apr 92

SYSTEMS/STORAGE

★★★★ **Duo Dock, Apple Computer, 408/996-1010, \$1079.** Immensely clever desktop-Mac-size housing for the Duo laptops provides back-panel connectors, a SuperDrive, electrical and physical support for external monitors, and two expansion slots. Although the Duo Dock is easy to like, some details, such as the difficulty of installing NuBus boards, belie Apple's usual attention to detail. Mar 93

★★★★ **FastCache Quadra, DayStar Digital, 404/967-2077, Quadra 950/900/700 version \$449, Quadra 900/700 version \$299.** PDS board provides 128K of secondary cache for a Quadra with 15ns static RAM (25ns on the 900/700 version). The average real-world speed improvement is 15 percent, although some operations benefit more from the cache card than others. May 93

★★★★ **Floptika 20/M, Procom Technology, 714/852-1000, \$585.** It is easy to recommend this floptical drive due to its speed, relatively low cost, bundled software, and lack of problems. Although it allows invalid SCSI ID addresses, it's a fine product. Sep 92

★★★★ **Freedom 120, Maxen, 619/944-0818, \$699.** Battery-powered hard drive provides three to four

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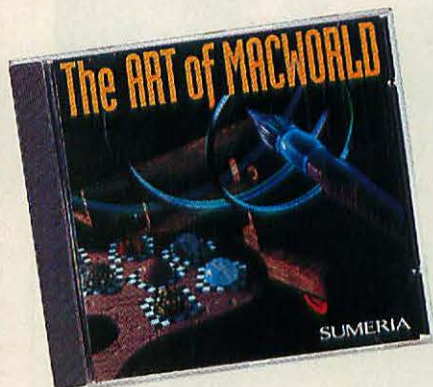
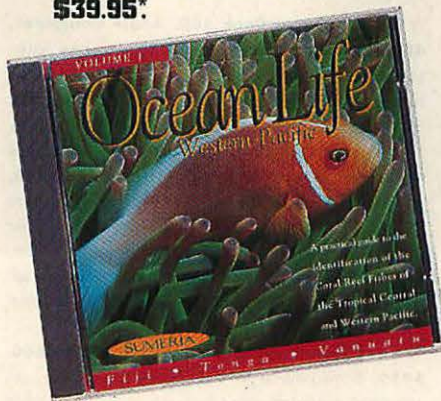


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hours of hard drive storage without a power cable; it performs at a respectable speed, but lacks a battery-power gauge and automatic sleep mode. The skimpy manual is the most serious problem. Sep 92

★★★ **Infinity Floptical 21MB, Peripheral Land, 510/657-2211, \$599.** The good points of this floptical drive include extensive documentation, switchable termination, and an autoeject function, but the bad points are the odd size, the incompatibility of the bundled software with System 7, and inappropriate formatting of 800K disks. Sep 92

★★★★ **Outbound Notebook System 2030S, Outbound Systems, 303/786-9200, 4/40 \$2799, 8/80 \$3299, 14/120 \$3999.** If raw power is what you're looking for in a notebook computer, this is the hands-down choice. It's lightweight, upgradable, and performs at a level between a Ilii and a IIfx, but the screen is only adequate. Sep 92

★★ **Performance/040 (33MHz), Impulse Technology, 404/889-8294, \$2399.** For disk-intensive tasks, this 68040 33MHz accelerator board tested slower than the native CPU and, in general, was slower than comparable accelerator boards. It is compatible with all Mac II's. Oct 92

★★★★ **PLI MiniArray 850MB, PLI MiniArray 2GB, Peripheral Land, 510/657-2211, \$6999.** These RAID storage systems contain multiple drives that work as a single unit; they're an excellent option for image processing or tasks that involve importing and exporting large files, but the price per megabyte is high. Jan 93

★★★ **PowerBook 145, Apple Computer, 408/996-1010, \$2149 to \$2499.** Adequate but essentially outdated notebook computer is an upgraded version of the discontinued PowerBook 140 with a faster 25MHz 68030 CPU, but RAM expansion is limited, and it doesn't have a built-in video port. Feb 93

★★★★ **PowerBook 160, Apple Computer, 408/996-1010, \$2429 to \$3149.** A built-in video port and gray-scale capability are the new features Apple offers with this notebook computer. While it offers good processing speed and power, the passive matrix display doesn't cut it for all-day use as a primary screen. Feb 93

★★★★ **PowerBook 180, Apple Computer, 408/996-1010, \$4109 to \$4469.** An active matrix screen and a math coprocessor are the only differences between this notebook computer and the PowerBook 160, but the beautiful display is worth the extra \$1000. Feb 93

★★★★ **PowerBook Duo 210 and 230, Apple Computer, 408/996-1010, 210 (4/80) \$2249, 230 (4/80) \$2609.** Apple's smallest computers have the pleasing heft, size, and shape of hardbound books but pack the horsepower of 030 chips. Although the screen, keyboard, and trackball (more of a "trackmarble") feel small, these computers virtually cry out to be picked up, handled, and used. Mar 93

★★★ **QuadFlextra, Quadram, 404/923-6666, \$495.** Remarkable super-high-density floppy drive uses an ingenious disk-formatting method to put just over 20MB on a single 3½-inch floppy disk, but it may not be as cost-efficient as other options. Apr 92

★★★★ **Quantum Passport XL 240, Quantum Corp., 800/624-5545, external chassis \$469, 240MB drive \$979.** An excellent piece of engineering, this fast, trouble-free, removable hard drive is designed to

solve the problem of how to transport data from one computer to another. The price is only somewhat discouraging. Oct 92

★★★★ **Radius Rocket 33, Radius, 408/434-1010, \$2499.** The accelerator board of choice for our reviewer, this 68040, 33MHz board is fast, reasonably priced, and compatible with a Mac II (with Rev. B ROM), IIfx, Ilii, or Ilii. Oct 92

★★★ **TokaMac II FX 33, Fusion Data Systems, 512/338-5326, \$2995.** CPU and FPU tasks on a Mac IIfx are faster than on a Quadra 950 with this 68040 33MHz accelerator board, but video- and disk-intensive tasks are still slower. It may be worth the cost if your IIfx already has a fast video board and more than enough memory. Oct 92

VIDEO/DISPLAY

★★★ **BookView Imperial, Computer Care, 612/371-0061, \$1399 (includes 6MB of RAM).**

This notebook-display adapter supports all common sizes of monitors, including 16-inch and 19-inch, plus both Mac and VGA. It is expensive, however, and uses 2MB of system memory for video processing. Feb 93

★★★ **Canon ESP, Canon USA, 516/328-5970, \$4500.** No-nonsense package enables you to shoot still-video pictures, digitize the video into a Mac for touch-up, and record the modified shots back to the camera for playback through any television set. It's good for presenters who need to incorporate photographs, but it is quite expensive. Apr 93

★★★ **Canon RC250, Canon USA, 714/753-4320, \$799.** An adequate choice for users looking for an inexpensive still-video system. Camera captures up to 50 color images per video floppy disk and hooks up to any television. Jun 92

★★ **Dycam Model 1, Dycam, 818/998-8008, \$895.** Compact, point-and-shoot, still-video camera records and downloads images in 8-bit gray-scale—as long as the battery doesn't die first. Jun 92

★★★★ **Macintosh 16" Color Display, Apple Computer, 408/996-1010, \$1599.** The display quality of Apple's 16-inch monitor is tough to beat. It has realistic color, minimal curvature, and a uniform display. Jun 92

★★★ **Power Portrait, Sigma Designs, 510/770-0100, \$899 or \$949.** Hook your Classic or PowerBook to this 15-inch portrait-style monochrome display. Built-in QuickDraw acceleration speeds up the slow SCSI connection on the one hand and results in a few software incompatibilities on the other. Feb 93

★★★★ **PowerVision, Mirror Technologies, 612/633-4450, with no RAM \$499, with 2MB of RAM \$699, with 4MB of RAM \$999.** Separate VRAM means you don't lose system memory with this nicely priced notebook display adapter. It only supports 12-inch and 14-inch monitors, and 15-inch portrait gray-scale and black-and-white monitors. Feb 93

★★★★ **VideoSpigot, SuperMac Technology, 408/245-2202, \$499 to \$1599.** Grab video from a camcorder, video deck, TV, or monitor with this easy-to-install board and save it as a 24-bit QuickTime movie. Comes with ScreenPlay, an application that lets you choose from among several compression options, frame rates, and window sizes. May 92 **m**

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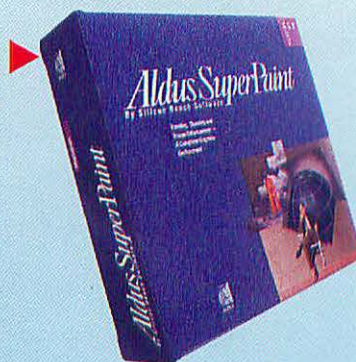


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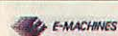
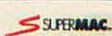
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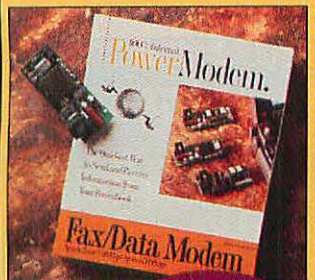
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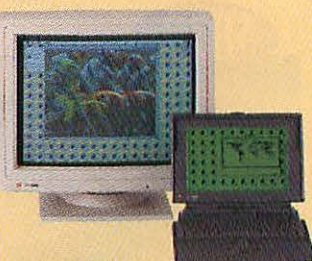
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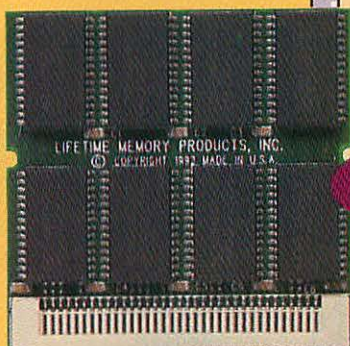
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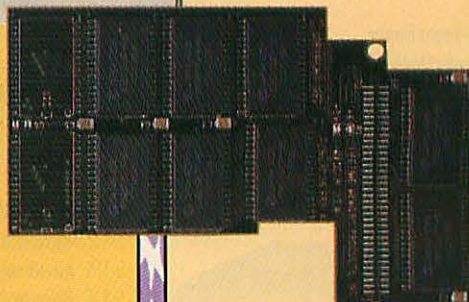


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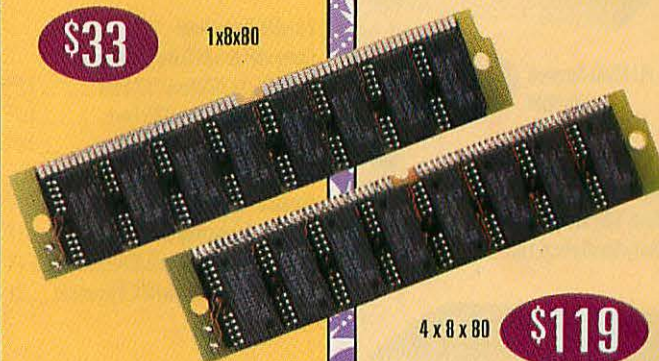
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4x8x80 (fx)	122
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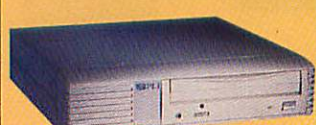
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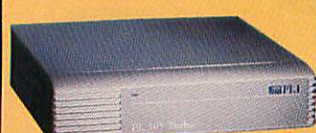
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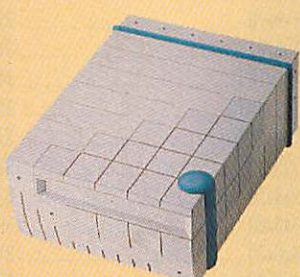
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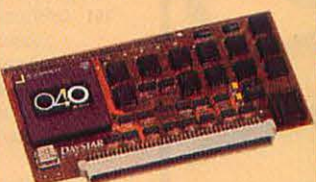
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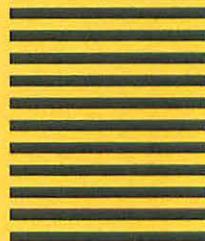
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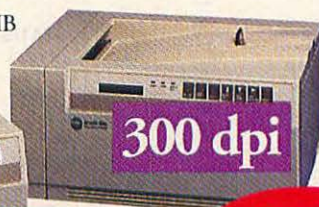
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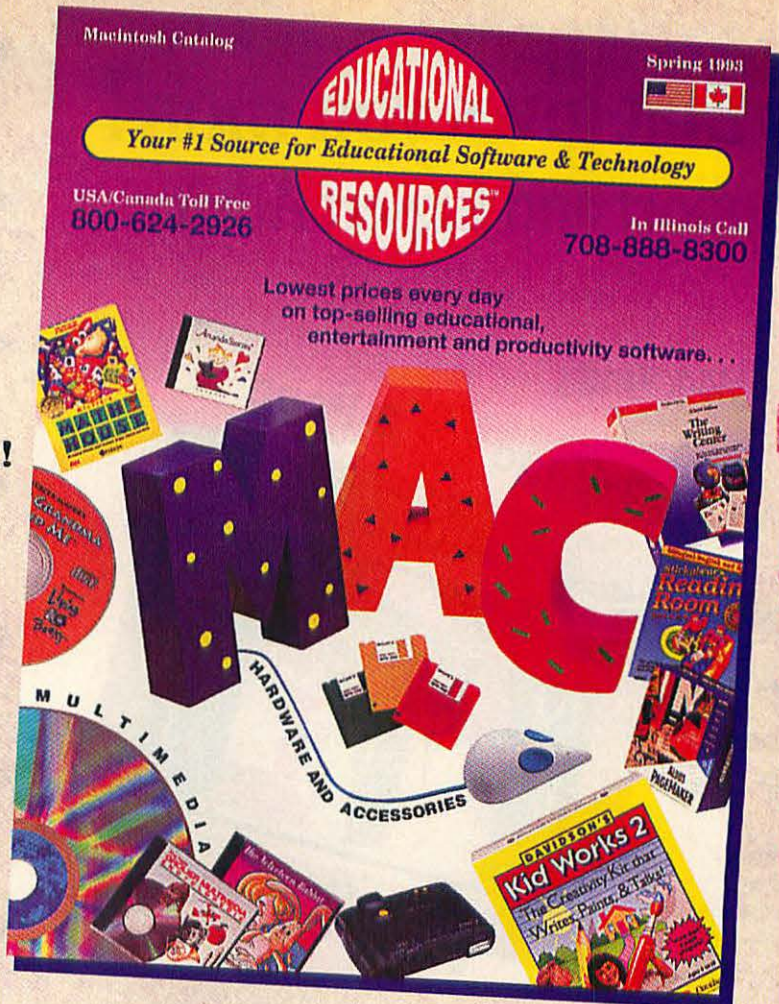
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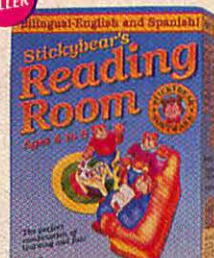
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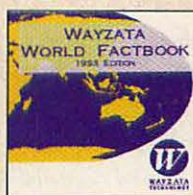


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25MHz 68040 accelerator

ROCKET SHARE.....\$399
Allows multi-processing with one or more Radius Rocket

VIDEOVISION.....\$1899
Color interface with video capture

PRECISION COLOR 24XP.....\$475
Accelerated 24-bit interface for 16" displays

PRECISION COLOR 24XK.....\$789
Accelerated 24-bit interface for 20" displays

PRECISION COLOR 24X.....\$1399
Accelerated 24-bit interface for 21" display

PRECISION COLOR 8XJ.....\$475
Accelerated 8-bit color interface, upgradeable

NEW! PRECISION COLOR DISPLAY 20i.....\$2569
Two-page, 20-inch color display

FULL PAGE DISPLAY 17".....\$565
Full-page, 17-inch monochrome portrait display

PRECISION COLOR PIVOT.....\$915
Full-page Multisync color display portrait & landscape

MONOCHROME TWO-PAGE DISPLAY 19".....\$869
Two-page, 19-inch monochrome landscape display

MONOCHROME TWO-PAGE DISPLAY 21".....\$1125
Two-page, 21-inch monochrome landscape display



NEC SilentWriter 95f
300DPI, Postscript Level 2
Auto PC/Mac Switching, 6ppm
\$1359

RASTEROPS CORRECTPRINT 300i
300 DPI Dye Sublimation
\$7499

QMS 860 HAMMERHEAD
600 DPI, 8ppm, Tabloid 11x17,
RISC, 12MB RAM
\$3975

HP DeskWriter
HP 550C \$715
Monochrome Inkjet 300 DPI
\$375

TI MicroLaser
PS/17 \$1175 PS/35 \$1319ppm,
Turbo - Postscript Level 2, RISC
\$1474

GCC PLP II
300 DPI
Personal Laser Printer
\$769



COLORPAGE T-16 II.....\$1249
Two-page, 16-inch Trinitron display

COLORPAGE T-19 II.....\$2269
Two-page, 19-inch Trinitron display

FUTURA SX.....\$479
Accelerated 24-bit color NuBus interface for 16" display

FUTURA MX.....\$825
Accelerated 24-bit color NuBus interface for 19" display

FUTURA LX.....\$859
Accelerated 24-bit color NuBus interface for 21" display

DOUBLECOLOR LX.....\$619
8-bit color interface for 21" display

DOUBLECOLOR LC.....\$389
8-bit color interface for 16" display with LC

DOUBLECOLOR SX.....\$345
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POWERLINK DESKNET.....\$579
Mindock add expansion ports to PowerBook Duo



GLOBAL VILLAGE TELEPORT GOLD.....\$419
14400bps Send/Receive Fax/Data Modem

GLOBAL VILLAGE TELEPORT SILVER.....\$346
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GLOBAL VILLAGE TELEPORT BRONZE.....\$192
24/96 Send/Receive Fax/Data Modem

PRACTICAL PERIPHERALS PM14400 FXSA.....\$405
14400bps Send/Receive Fax/Data modem

TWINCOM 24/96.....\$125
24/96 Send/Receive Fax/Data modem

PARCEON 14400.....\$279
14400bps send/receive fax/data modem

PSI COMSTATION FOUR.....\$315
9600/4800 send/receive fax/data modem

SUPRA V.32BIS / MAC PACKAGE.....\$285 / \$319
V.32bis send/receive fax/data modem / with cable, software

SUPRA 144PB / PLUS.....\$275 / \$375
PowerBook internal 14400 fax/data modem / with voice



ARTZ TABLET.....\$299
6 x 8 pressure-sensitive digitizing tablet

6 x 9 STANDARD TABLET.....\$435
6 x 9 pressure-sensitive digitizing tablet

12 x 12 STANDARD TABLET.....\$635
12 x 12 pressure-sensitive digitizing tablet

12 x 12 ELECTROSTATIC TABLET.....\$695
12 x 12 pressure-sensitive digitizing tablet

12 x 18 STANDARD TABLET.....\$959
12 x 18 pressure-sensitive digitizing tablet

12 x 18 ELECTROSTATIC TABLET.....\$1010
12 x 18 pressure-sensitive digitizing tablet

18 x 28 STANDARD TABLET.....\$2515
18 x 28 pressure-sensitive digitizing tablet

PAINTER V.2.0.....\$225
MacUser 1991 Eddy Award-Winning Digital Paint Software
Special price with purchase of Wacom tablet



LZR 960.....\$1579
Laser printer with RISC processor, 2MB onboard

LZR 965.....\$1999
Laser printer with 600 x 600 dpi, 8MB onboard

LZR 1560.....\$3025
Laser printer with 4MB onboard, prints tabloid size

LZR 1555.....\$3059
Laser printer with RISC processor, 4MB onboard

JOLT.....\$4149
Laser printer, full-color, with RISC processor

LZR 960 & 965 PAPER CASSETTE.....\$39
Optional letter or legal tray for LZR 1560 and LZR 1555

LZR 1560 & 1555 PAPER CASSETTE.....\$69
Optional letter or legal tray for LZR 1560 and LZR 1555

LZR 1560 4MB UPGRADE.....\$309

LZR 960 4MB UPGRADE.....\$349
LZR 960 8MB UPGRADE.....\$599

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THUNDERSTORM PRO\$2789	Graphics accelerator bundled with Thunder/24
SPECTRUM/24 SERIES IV\$759	Accelerated 24-bit color interface for 21" display
THUNDER/8 / THUNDER/24CALL	Thunder/8 - Accelerated 8-bit color interface Thunder/24 - Accelerated 24-bit color interface
NEW! SUPERMATCH Hi-Res 20-T\$3025	Two-page, 20-inch Trinitron high-resolution display
SUPERMATCH 20-T\$2325	Two-page, 20-inch Trinitron multimode display
SUPERMATCH 20\$1399	Two-page, 20-inch color display
SUPERMATCH 17-T\$1069	Full-page, 17-inch Trinitron display
SPECTRUM/24 PQD PLUS\$1409	Accelerated 24-bit color interface for 21" display
PHOTOSPEED / PRO\$2999 / \$3799	CD-ROM compatible accelerated QuickDraw CD-ROM compatible accelerated QuickDraw & 24-bit color interface
PLATINUM 20 / 21 TWO-PAGE\$869 / \$979	Two-page, 20-inch / 21-inch gray-scale display

PAINTBOARD LI\$789	Accelerated 24-bit color interface for up to 20" displays
ProColor 32\$2995	32-bit True-Color interface
PHOTO PRO\$749	RISC adapter accelerates Photoshop functions
24SX / 24MX / 24MXQ\$605 / \$1135 / \$1135	Accelerated 24-bit color interface for 13" / 16" with Mac II / 21" with Quadra
24STV / 24XLTV\$755 / \$2548	Accelerated 24-bit color for 13" video display/capture Accelerated 24-bit color, video display/capture
8XL / 24XL\$899 / \$1699	Accelerated 8-bit color interface, upgradeable to 24-bit Accelerated 24-bit upgraded color interface
COLORBOARD 264/SE30\$685	24-bit color interface for 13" display with SE30
CORRECTCOLOR CALIBRATOR\$1815	Calibrates displays with interface cards
21" COLOR DISPLAY\$2569	Two-page, 21-inch color display
20" MULTI-SCAN TRINITRON\$2125	Two-page, 20-inch Trinitron display
20" MULTIMODE HITACHI\$1325	Two-page, 20-inch Trinitron display
CORRECTPRINT 300i\$7499	Dye sublimation printer offers 300 cpi output

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INFINITY 40 TURBO EXTERNAL\$409	44MB SyQuest removable cartridge drives
INFINITY 88 RW44 EXTERNAL\$619	88MB SyQuest drive reads and writes to 44MB cartridges
INFINITY 128MB 3.5" OPTICAL\$1299	Removable, rewritable optical cartridge drive
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1.0GB MINIARRAY\$2775	Fast 1.0GB fixed hard drive with QuickSCSI
INFINITY OPTICAL 5.25" 600MB SONY\$2699	Removable, rewritable optical cartridge drive
INFINITY MAXOPTICAL 1GB\$3499	1.0GB Optical disk drive, WORM compatible
CD-ROM DRIVE\$619	Multi-Session Photo CD Compatible Drive

MICROTEK SCANMAKER II\$835	Color flatbed scanner, 600 x 300 dpi
MICROTEK SCANMAKER IIx\$1075	Color flatbed scanner, 600 x 300 dpi, PhotoShop
UMAX 630\$1075	Color flatbed scanner, 600 x 300 dpi, PhotoShop
UMAX 630 WITH TRANSPARENCY\$1725	
UMAX 840\$1349	Color flatbed scanner, 800 x 400 dpi, PhotoShop
UMAX 840 WITH TRANSPARENCY\$1973	
UMAX SCAN OFFICE\$825	Grayscale flatbed scanner, PhotoShop
UMAX TRANSPARENCY ADAPTER\$679	Adds transparency scan capability to Umax scanner
AGFA ARCUS\$2999	Color flatbed one-pass scanner, 1200 x 1200 dpi, PhotoShop
AGFA ARCUS WITH TRANSPARENCY\$3799	
SHARP JX320\$999	Color flatbed scanner, 300 x 300 dpi, PhotoShop
SHARP TRANSPARENCY ADAPTER\$849	Adds transparency scan capability to Sharp scanner
HP SCANJET IIC\$1299	Color flatbed scanner, 400 x 400 dpi



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\$269

MS Excel 4.0
\$289

QUARK XPRESS
\$499

MORPH
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EFI CACHET 1.1
\$409

INFINI-D
\$689

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BUNDLE - 20" COLOR DISPLAY w/ 8-BIT CARD	\$1739
BUNDLE - 20" COLOR DISPLAY w/ 24-BIT CARD	\$2099
APPLE 14" / 16" RGB DISPLAY	\$515 / \$1199
NEC MultiSync 3FGX / 4FG	\$629 / \$755
NEC MultiSync 5FG / 6FG	\$1349 / \$2375
SEIKO CM-1445	\$449
SIGMA DESIGNS ERGO VIEW 17"	\$1249
SIGMA DESIGNS POWER PORTRAIT	\$599

PRINTERS	
APPLE STYLEWRITER II	\$319
APPLE LASERWRITER SELECT 300 / 310	\$785 / \$1025
APPLE PERSONAL LASERWRITER NTR	\$1525
APPLE LASERWRITER II / IIG	\$1749 / \$2189
APPLE LASERWRITER PRO 800 / 630	\$1759 / \$2375
GCC BLP ELITE	\$1179
GCC PLP II / IIS	\$769 / \$1099
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PROMETHEUS 24/96 / 96/96 S/R FAX	\$259 / \$599
Zoom AFX EXTERNAL 96/48 S/R FAX	\$99

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EMAC METRO	
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FRAGMENT DESIGN PAINTER v.2.0	\$249
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RETROSPECT v.1.3	\$131
STRATAVISION 3D v.2.6	\$549
TYPESTYLER v.2.0	\$122
WORDPERFECT v.2.1	\$265

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AE QUICKSILVER IISi with FPU	\$245
AE TRANSWARP LC 33MHz with FPU	\$895
NEWER TECH VARIABLE QUADRA OVERDRIVE	\$259

DRIVES & TAPES	
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APPLIED ENGINEERING 1.44 / PLUS	\$209 / \$283
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DGR 128REM TURBO 3.5" MO	\$1199
DGR 256REM 3.5" MO	CALL
FURTSU 520MB	\$869
FURTSU 1.2GB	\$1289
NEC CDR-37 / CDR-74 CD-ROM	\$406 / \$849
QUANTUM 127MB ELS	\$319
QUANTUM PRODRIVE 240MB	\$399
QUANTUM 525MB PRO	\$999

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TOSHIBA 3401A CD-ROM	\$685

NetWORKING	
ASANTE 10BASET Hub	\$239
ASANTE MACCON + IIE 64K	\$159

SNOOPER WITH VIREX \$109	
SNOOPER WITH NuBUS \$139	

DAYNA EtherPRINT / PLUS	\$329 / \$599
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FARALLON TIMBUKTU REMOTE ACCESS PACK	\$849
SHIVA FASTPATH 5	\$1850
SHIVA NETBRIDGE / TELEBRIDGE	\$315 / \$405

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CLUBMAC 88c Reads & Writes 44mb Cartridges



FEATURING CLUBMAC 88c REMOVABLES*



SyQuest REMOVABLE TECHNOLOGY

SyQuest Drives include a TWO Year Warranty, one cartridge & necessary cables. SCSI Director™ Formatting Utility • SyQuest Cartridges carry a ONE Year Warranty.

ClubMac 88c External (SQ5110C)	\$579
ClubMac 88c Internal	\$559
ClubMac 88c Dual	\$1045
* ClubMac 88c will read and write 44mb cartridges, but will not format 44mb cartridges.	
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ClubMac 44mb External (SQ555)	\$385
ClubMac 44mb Internal	\$345
ClubMac 44mb Dual	\$695
CLUBMAC 88MB REMOVABLES	
ClubMac 88mb External (SQ5110)	\$489
ClubMac 88mb Internal	\$469
ClubMac 88mb Dual	\$875
SYQUEST REMOVABLE CARTRIDGES	
44mb Cartridge	\$63
88mb Cartridge	\$97

Quantum



Unformatted Capacity	Model	Average Access	Actual MAC Capacity	Internal	External
GO•DRIVE SERIES (2.5" HARD DRIVES DESIGNED FOR NOTEBOOKS)					
80mb	GO-80	17ms	80mb	\$299	\$399
120mb	GO-120	17ms	120mb	\$389	\$489
ELS SERIES (3.5" LOW PROFILE AND LOW POWER)					
42mb	ELS42	19ms	40mb	\$175	\$235
85mb	ELS85	17ms	82mb	\$199	\$259
127mb	ELS127	17ms	124mb	\$269	\$329
170mb	ELS170	17ms	160mb	\$299	\$359
LPS SERIES (3.5" LOW PROFILE)					
105mb	LPS105	11ms	100mb	\$255	\$315
240mb	LPS240	10ms	234mb	\$399	\$459
525mb	LPS525	10ms	525mb	\$909	\$969
PRODRIVE SERIES (3.5" HALF HEIGHT)					
425mb	PRO425	9ms	406mb	\$879	\$939
700mb	PRO700	10ms	700mb	\$1195	\$1255
1.0GIG	PRO1050	10ms	1001mb	\$1339	\$1399
1.2GIG	PRO1225	10ms	1165mb	\$1495	\$1555

ELS, LPS, PRO drives carry a TWO Year Warranty. Go-Drives carry a ONE Year Warranty.

CONNER

Unformatted Capacity	Model	Description	Average Access	Actual MAC Capacity	Internal	External
85mb	CP30080E	3.5" Low Profile	17ms	82 mb	\$199	\$259
170mb	CP30170E	3.5" Low Profile	17ms	160 mb	\$289	\$349
212mb	CP30200	3.5" Low Profile	12ms	206 mb	\$369	\$429
540mb	CP30540	3.5" Low Profile	10ms	515 mb	\$899	\$959

Conner drives carry a ONE Year Warranty.

Maxtor

UP TO TWO YEAR WARRANTY



Unformatted Capacity	Model	Average Access	Actual MAC Capacity	Internal	External
XT SERIES (3.5" LOW PROFILE)					
120mb	7120XT	15ms	121mb	\$239	\$299
207mb	7213	15ms	202mb	\$355	\$415
LXT AND MXT SERIES (3.5" HALF HEIGHT)					
330mb	LXT-340	15ms	324mb	\$589	\$649
535mb	MXT-535	8.5ms	521mb	\$975	\$1035
1240mb	MXT-1240	8.5ms	1150mb	\$1599	\$1659
PANTHER SERIES (5.25" FULL HEIGHT)					
1.2GIG	PO-12S	13ms	997mb	\$1295	\$1395
1.7GIG	PO-17S	13ms	1433mb	\$1595	\$1695

Maxtor 3.5" Drives carry a ONE Year Warranty. Maxtor 5.25" Drives carry a TWO Year Warranty.

Seagate

FEATURING THE... ELITE SERIES



Unformatted Capacity	Model	Description		Average Access	Actual MAC Capacity	Internal	External
1.6GIG	ST41651N	5.25" Full Ht	Wren-8	15ms	1350mb	\$1679	\$1779
2.1GIG	ST42100N	5.25" Full Ht	Wren-9	12.9ms	1900mb	\$1869	\$1969
1.6GIG	ST41600N	5.25" Full Ht	Elite-1	11.5ms	1307mb	\$1839	\$1939
2.4GIG	ST42400N	5.25" Full Ht	Elite-2	11ms	2050mb	\$2539	\$2639
3.4GIG	ST43400N	5.25" Full Ht	Elite-3	11ms	2750mb	\$3429	\$3529

Seagate Drives carry a ONE Year Warranty.

FIVE YEAR WARRANTY

FUJITSU

Unformatted Capacity	Model	Description	Average Access	Actual MAC Capacity	Internal	External
425mb	M2623SA	3.5" Half Height	9ms	405mb	\$895	\$955
520mb	M2624SA	3.5" Half Height	9ms	496mb	\$945	\$1005
1.1GIG	M2694	3.5" Half Height	8.5ms	995mb	\$1695	\$1755
1.2GIG	M2266	5.25" Full Height	14.5ms	1029mb	\$1375	\$1475
2.0GIG	M2652	5.25" Full Height	14.5ms	1600mb	\$2295	\$2395
2.4GIG	M2654	5.25" Full Height	11.5ms	2000mb	\$2499	\$2599

ClubMac TAPE BACKUP Systems

Capacity	Model	Description	Media	Internal	External
155mb	Teac MT2ST/N50	Analog	CT600N	\$429	\$449
600mb	Teac MT2ST/F50	Analog	CT600F	\$629	\$649
250mb	Archive Viper 250	Analog	DL6250	\$479	\$499
500mb	Archive Viper 500	Analog	DL6250	\$709	\$729
2.0GIG	Archive Python	DAT, DDS	4mm	\$1129	\$1149
3-5GIG	Archive Turbo DAT	DAT, DDS-DC	4mm	\$1339	\$1359
2.0GIG	HP 35470A	DAT, DDS	4mm	\$1329	\$1349
3-5GIG	HP 35480A	DAT, DDS-DC	4mm	\$1529	\$1549

Includes RetroSpect v.2.0c Backup Software, One Tape and ONE Year Warranty

Bundled with RetroSpect v.2.0c Backup Software

ClubMac OPTICAL Drives

Model		Capacity	Description	Seek	External
CMO-OD3000	Teac	128mb	3.5" Half Ht	45ms	\$989
CMO-LF3004	Panasonic	128mb	3.5" Half Ht	45ms	\$1129
CMO-3100E	Ricoh	128mb	3.5" Half Ht	45ms	\$1075
CMO-3051E	Ricoh	594/652mb	5.25" Full Ht	28ms	\$2345
NEW!!	Sharp	594/652mb	5.25" Full Ht	30ms	\$2295
TAHITI II	MaxOptix	650/1.0GIG	5.25" Full Ht	35ms	\$3195
128mb Cartridge			3.5" Single Sided		\$39
594/652mb Cartridge			5.25" - 512/1024 bytes/sec		\$99

All ClubMac Opticals include ONE cartridge and ONE Year Warranty.

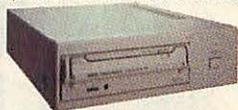
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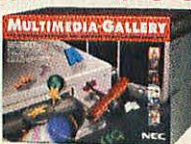
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GREAT VALUE



MULTISYNC FG COLOR MONITORS

MultiSync 3FGx

- 15" multiple frequency color monitor
- High contrast polished screen
- Resolution up to 1024 X 768

\$609

Get a \$100 rebate when you buy the NEC MacFG 24Xp Color Display Interface Card and a 15" or 17" MultiSync FG Series Color Monitor

MultiSync 4FG

- 15" multiple frequency color monitor
- AccuColor Control System
- MPR-II compliant
- Advanced digital controls
- Resolution up to 1024 X 768

\$729

MultiSync 3FGx (15" Color) **\$609**

MultiSync 4FG (15" with AccuColor) **\$729**

MultiSync 5FG (17" with AccuColor) **\$1299**

MultiSync 6FG (21" with AccuColor) **\$2349**

MacFG 24Xp (24-bit video card for NEC 15" & 17") **\$495**

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• 6 ppm • 35 fonts • 2 MB RAM • LESS MFG REBATE **-\$250**

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• Adobe PostScript Level 2 • 10 ppm • 35 fonts • 2 MB RAM • HP LaserJet III Emulation

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MODEL 97FX \$1949

• The Model 95fx can send & receive faxes to/from any standard fax machine or other Model 95fx

* Less Manufacturer's Rebate, Offer Expires 4/30/93



HP SCANJET IIC COLOR SCANNER \$1295

- 400 x 400 dpi (300 dpi via interpolation)
- Single-pass scanning delivers superior image quality in 24-bit color & 8-bit grayscale modes
- HP AccuPage technology improves OCR accuracy
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AUTOMATIC DOCUMENT FEEDER \$279



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POWERCACHE

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40 MHz PowerCache* **\$545** w/o FPU **\$635** w/ FPU

50 MHz PowerCache* **\$715** w/o FPU **\$845** w/ FPU

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*PowerCache Adapter not included

CACHE CARDS

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FastCache IIsi with 68882 **\$349**

FastCache IIfx **\$199**

FastCache Quadra-Q700/900 **\$249**

FastCache Quadra-Q700/900/950 **\$375**

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PowerMath LC **\$115**

QMS

QMS-860 Hammerhead **\$3939**

QMS-PS 410 **\$1439**

EPSON

ES-600C 1200 dpi \$859

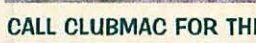
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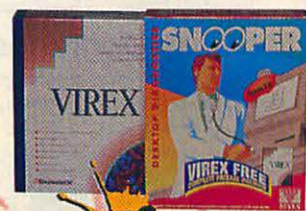
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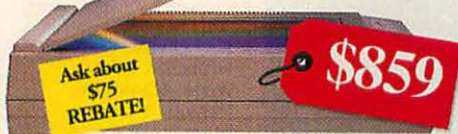
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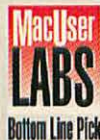
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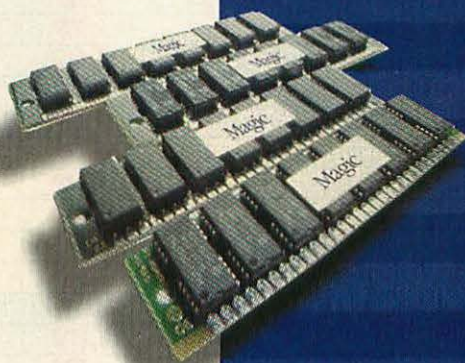
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W35



WE WANT TO BE YOUR MACINTOSH SOLUTIONS PARTNER (...WE'RE REALLY NOT INTERESTED IN A ONE-SHOT SALE)

In these difficult economic times, value is the most important criteria for making a purchasing decision. We're in our eighth year of providing the best value in the Mac market. Sure, there are some companies that can give you a better price on a particular product...but will they stand behind it (and by you...and will they even still be in business)? We will. We're a subsidiary of a financially-sound public company, and have been members of the Better Business Bureau since 1987.

We offer you the best overall value, customer service, technical support, and financing options...because we're interested in being your total solutions partner...and because we'll be around to help you.

We've become known as America's one-stop source for Macintosh solutions. Why? Because our friendly sales and customer service teams have always been more interested in solving your computing challenges than in making a quick buck. From time to time, they have to talk a customer out of buying more equipment than they really need. That's because we believe in building relationships and providing total solutions...and that's why we're America's largest mail order seller of Mac hardware.

Réal Provencher
Réal Provencher, President

HARDWARE THAT FITS



E-MACHINES



SUPERMAC

Monitors: all sizes, brands & prices

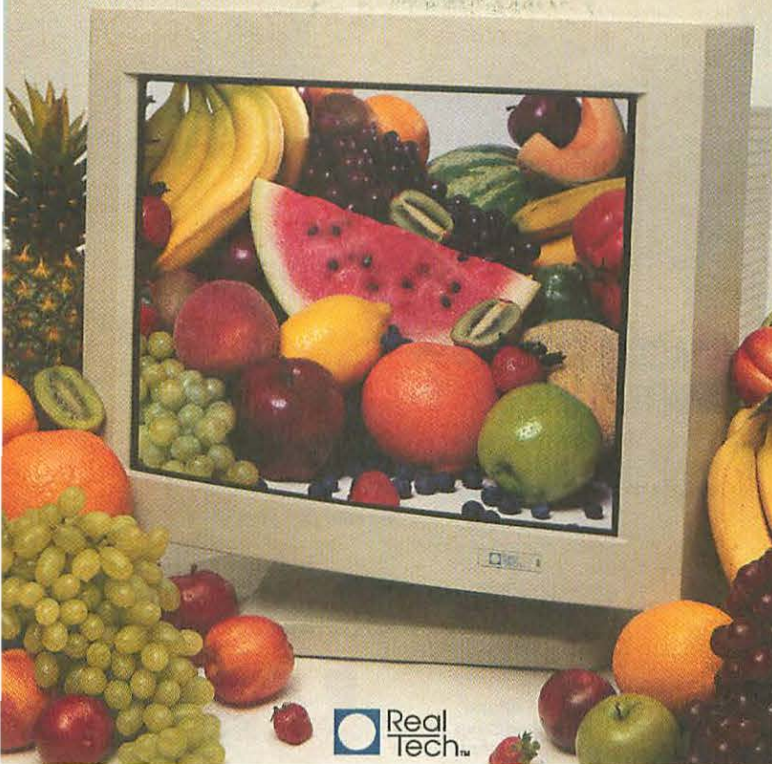
Need help choosing a monitor? Not sure if you need one that auto-syncs? Call our friendly sales team. They're happy to answer your questions.

	Price	Tube type	640 x 480	640 x 870	832 x 624	1024 x 768	1152 x 870	Auto-syncing	Anti-glare
A. Radius 21" Color	\$3,069	Hitachi							
NEC 21" 6FG Color	2,429	NEC							
SuperMac 21" Mono/Grayscale	989	—							
B. SuperMac 20" (SuperMatch)	\$1,499	Hitachi							
C. RasterOps 20" Trinitron Multi-Mode	2,329	Trinitron							
D. RealTech 20" Trinitron Multi-Mode	1,895	Trinitron							
Radius Precision Color 20"	2,389	Trinitron							
RasterOps 20" Hitachi Color	1,469	Hitachi							
* SuperMac 20" (SuperMatch Dual-Mode)	2,499	Trinitron							
E-Machines 19" Color (T19 II)	2,399	Trinitron							
E. Mitsubishi 17" Diamond Pro	\$1,199	Trinitron							
F. NEC 17" 5FG Color	1,329	NEC							
G. Sony 17"	1,149	Trinitron							
H. RealTech 17" Multi-Mode	995	Hitachi							
I. Seiko Instruments 17" CM1760LR	1,249	Trinitron							
J. RasterOps 16" (RasterOps Sweet 16)	\$1,249	Panasonic							
* E-Machines 16" Color (ColorPage T16)	1,299	Trinitron							
K. NEC 15" 4FG Color	789	NEC							
L. Radius 15" Precision Color Pivot	\$959	Non-Trinitron							
M. Sigma 15" Grayscale (PageView GS)	579	Phillips							
N. RealTech 15" Grayscale	449	—							
Sigma 15" Grayscale (Power Portrait)	659	Phillips							
NEC 15" 3FGX Color	669	NEC							
O. Seiko Instruments 14" Color (CM1445)	\$499	Trinitron							
P. Sony 13" Color	689	Trinitron							

* shown above

Your Hardware That Fits partner will tell you which monitors are on-board compatible, and which ones require a card.

Your one-stop source for



Real Tech 20" Trinitron Color Monitor

- Auto-syncing
- 24- or 8-bit color
- Multi-mode display
- 7 factory pre-set resolutions
- 7 programmable settings
- 1024 x 768 standard resolution
- Trinitron® tube from Sony

\$1,895

Lease: \$52/mo.

1024 x 768 standard resolution; will auto-sync to 640 x 480, 832 x 624, 1024 x 768, and 1152 x 870. Multi-level bit depth support provides accurate screen display for all applications. Will interface with Quadras, and with popular video cards.

“ In the graphic design business, the desktop publishing hardware is changing so rapidly that it can be confusing what to buy — Jon’s knowledgeable and friendly help guided me toward the right decision for my company. ”

— Elaine Kropveld
EKlectic Images

Real Tech 17" Multi-Mode Color Monitor



\$995

Lease: \$27/mo.

- Multi-mode
- Auto-syncs to 1024 x 768
- 832 x 624 standard resolution
- Quadra-ready



TOLL-FREE
TECH SUPPORT:

1-800-364-MACS



\$1029

Lease: \$28/mo.



\$489

Lease: \$60/mo.

WACOM CORDLESS DIGITIZING TABLETS

Precise, real-time control over graphic input...brings back the delight of freehand drawing!

Cordless, pressure sensitive stylus translates your penstrokes into line width, spray density, color changes, and other programmable effects. Paint, draw, trace, and point as naturally as if you were writing.

The standard tablet has a plain surface. The electrostatic tablet is ideal for video graphics, photo retouching, and print pre-press work.

Wacom ArtZ Graphics Tablet
6" x 8" High Speed ADB ...**\$319**

Wacom (SD Series)
6" x 9" Standard**\$489**
12" x 12" Standard.....**689**
12" x 12" Electrostatic.....**759**
12" x 18" Standard**1029**
12" x 18" Electrostatic**1099**

You can always count on our tech team. We receive dozens of customer letters praising their helpfulness and friendly attitude. They're always ready to help when you have a problem.

Seated, left to right: Paul and Craig. Standing: Chris, Tom, Dan, Mike, and Dave.



CUSTOMER SERVICE

When you order from us, you get computer experts, not clerks!

All of our salespeople have a minimum of three years of computer experience. They're trained in Apple's intensive program, as well as our own. They're ready to help you (with a smile!) both before and after the sale.

TECH SUPPORT

Our tech team is well trained, well informed, and well known for their ability to solve customers' problems with a minimum of inconvenience to the customer. We have the best tech support in the business. And it's toll-free: **1-800-364-MACS.**

FINANCING OPTIONS

We've made it easier than ever to own our productivity-enhancing products.

- VISA and MasterCard
- corporate P.O. accounts (call for information)
- business leasing available

All prices are subject to change without notice. ©1993.

GUARANTEE

Our famous guarantee: If you don't like it, we'll buy it back. If you're not 100% satisfied, call for your RMA number and return the product within 30 days of the ship date. We'll refund your purchase price (minus consumables for printers).

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- 1 **True Lease**...with 10% buy-out option
- 2 **Installment Lease**...with \$1.00 buy-out option
- 3 **Speed Lease**...90- or 180-day terms, with buy-out or conversion to other leases
- 4 **20/20 Lease**...10% security deposit, 20 equal payments, 10% buy-out
- 5 **90-day Deferred Lease**...no payment for 90 days; first and last payment in advance

**All leases are subject to credit approval. All lease payments in our ads are based on the "True Lease" program at 48 months. Prices, lease prices, and rates are subject to change without notice.*

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Toll-free information: 1-800-364-LESS

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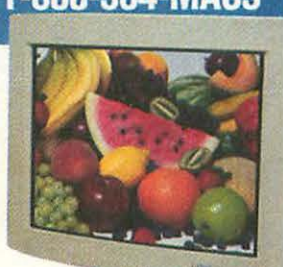
A **radius**



B **SUPERMAC**



C **RASTEROPS**
THE ART & SCIENCE OF COLOR™



D **Real Tech**



E **MITSUBISHI**



F **NEC**



G **SONY**



H **Real Tech**



I **SII**
Seiko Instruments



K **NEC**



M **SIGMA DESIGNS**

Don't know which card
is compatible with
your CPU & monitor?
Call us toll-free.

	Price	Maximum resolution	Accelerated
RASTEROPS			
ProColor 32	\$3,219	1152 x 870	■
PaintBoard 24	1,599	1152 x 870	■
8XL	479	1152 x 870	■
PaintBoard Li (24)	829	1024 x 768	■
245TV*	799	640 x 480	■
MediaTime*	1,599	640 x 480	■
SUPERMAC			
Spectrum/24 PDQ Plus	\$1,549	1152 x 870	■
Spectrum/8 NuBus	419	1152 x 870	■
Spectrum/24 Series IV	829	1024 x 768	■
Spectrum/8*24 PDQ	829	640 x 480	■
Spectrum/8*24	579	640 x 480	■
Video Spigot*	369	160 x 120	■
Video Spigot & Sound*	479	160 x 120	■
RADIUS			
Precision Color 24X	\$1,649	1152 x 882	■
Precision Color 8XJ	499	1152 x 882	■
Precision Color 24XK	829	1024 x 768	■
Precision Color 24XP	499	832 x 624	■
Video Vision*	1,979	640 x 480	■
E-MACHINES			
ColorLink DC/T (8-bit with Ethernet)	519	1024 x 768	■
ColorLink SX/2 (24-bit with Ethernet)	649	1024 x 768	■
Futura SX24	499	1024 x 768	■
DoubleColor LX (8)	699	1152 x 870	■

*24-bit; captures up to 30 frames per second



N **Real Tech**



L **radius**



O **SII**
Seiko Instruments



P **SONY**

monitors!

Hours: 8 am-7 pm Central Standard Time

30-DAY MONEY-BACK GUARANTEE on all hardware (except printer consumables and special-order items). Before returning merchandise, call our Customer Service Dept. toll-free to receive a returned merchandise authorization number (RMA), which must be included with any products you return. No C.O.D. returns, please. Thank you for your cooperation. ALL PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. Hardware That Fits is located at 610 S. Frazier in Conroe, Texas 77381.

Toll-free phone ordering
(or fax 24 hours a day)

FAX:
1-409-539-4141

Scanners

Flatbed desktop scanners for 24-bit color, 8-bit grayscale, and black/white images. Ideal for mid-range output or position prints for mockups/presentations.

	Price	DPI	Brightness & contrast levels	Scanning area	Flat art	Transparencies	Slides	Software
MICROTEK								
Scanmaker II	\$909	600	14	8.5 x 13.5	■			Includes limited version of Adobe Photoshop
Scanmaker IIXE	1,179	600	14	8.5 x 13.5	■			Includes full version of Adobe Photoshop
Scanmaker 1850 Slide Scanner	1,569	1850	14	2.5 square inches				Includes full version of Adobe Photoshop
Transparency Option		(1850)	(14)			■		
REALTECH								
Scan 800	\$1,099	800	200	8.5 x 11.75	■			Includes Scan-Match color calibration software
Optional Adobe Photoshop	200							
Scan 800 with Transparency Option	1,595	800	200	8.5 x 11.75	■	■	■	
UMAX								
UC 630	\$1,179	600	51	8.5 x 14	■			Includes full version of Adobe Photoshop
Transparency Option	729	(600)	(51)	6 x 9	■	■	■	
UC 840	1,329	800	51	8.5 x 14	■			Includes full version of Adobe Photoshop
Transparency Option	729	(800)	(51)	6 x 9	■	■	■	



The photo above is a 300 dpi image of an 8 x 10 transparency. It was scanned on the RealTech Scan 800 with the Transparency Option (shown below), then adjusted with ScanMatch and color-corrected with Adobe Photoshop.



MICROTEK

Real Tech

Real Tech Scan 800 with Transparency Option



MICROTEK



SII

Seiko Instruments Personal ColorPoint PSE

Prints full-bleed comps on plain laser paper (up to 10.1x14.33) or transparency film. 300 dpi color thermal printer uses 16 MHz RISC processor. 5 Mb RAM standard, upgradable to 9 or 21 Mb. Adobe PostScript® compatible. Includes AppleTalk, parallel, and RS-232 interfaces, plus an optional SCSI port. Continuously polls all interfaces;

\$2,699
Lease: \$73/mo.



reconfigures automatically. 17 resident fonts.

RASTEROPS
THE ART & SCIENCE OF COLOR™

\$8,099 Lease: \$222/mo.

RasterOps CorrectPrint 300i Dye Sublimation Printer with 36 Mb

Uses a 4-color (CMYK) dye sublimation thermal process at 300 dpi for photographic-quality output. Prints on special sheeted paper or transparencies, not on rolls. 8.1" x 11" image size on legal paper. Uses a RISC controller, 35 resident fonts, three interfaces, including TCP/IP.

RealTech Color 350

\$5,995
Lease: \$164/mo.

Prints 11x17 (OB size)* 300 dpi edge-to-edge comps for about \$1.13 per page. (Letter-size output, approx. 69¢ each.) Creates true black text—uses 4 colored ink sheets (CMYK). RISC processor. 10 Mb of RAM, upgradable to 18 or 34 Mb. 3 standard interfaces. 39 resident fonts. Adobe PostScript® compatible; PANTONE® approved** color matching.



Real Tech

*with additional memory
**PANTONE is Pantone, Inc.'s check-standard trademark for color.

If you're looking for PRINTERS you'll get the best value & highest quality from us

How many pages do you print each month? What page-per-minute speed do you require? We only sell printers that can handle your needs. If you don't see what you want listed here, please call us toll-free.

LETTER SIZE

Real Tech Laser	\$1595
NEC Silentwriter 95	1399
NEC Silentwriter 95fx	1879
NEC Silentwriter 97	1719
NEC Silentwriter 97fx	2199
NewGen PS660	2699
NewGen PS880P	2119
Texas Instruments PS17	1249
Texas Instruments Turbo	1595

TABLOID SIZE

Real Tech 400	\$3195
NewGen 660B	4059
QMS 860	4279
NewGen 660B with Ethernet	4499

COLOR

Real Tech Color 350	\$5995
Seiko Instruments Personal ColorPoint PSE	2699
QMS 210	4699
RasterOps Correct Print 300i	8099



**DO YOU FEEL THE NEED
FOR SPEED? CALL, AND
WE'LL MATCH YOU WITH
THE RIGHT ACCELERATOR.**

DAYSTAR DIGITAL

DAYSTAR
DIGITAL

NEW! Turbo 040 Accelerators

Get the maximum in 68040 acceleration and 100% compatibility. For Mac IIci and IIx; includes math chip.

25 MHz Turbo 040 **\$1099**
33 MHz Turbo 040 **1349**

25 MHz FastCache Turbo 040 **259**

33 MHz FastCache Turbo 040 **339**

Universal PowerCache Accelerators

Math chip available.
33 MHz Accelerator **\$379**
40 MHz Accelerator **549**
50 MHz Accelerator **719**
PowerCache Adapter **40**

Charger (Photoshop Accelerator)

Includes PicturePress 2.5, Charger Plug-ins, and Kodak Photo CD access with clip art images.

Charger **\$799**

RADIUS

radius

For the Mac II family. Includes QuickDraw and display-list acceleration software.

Radius Rocket 25i **\$1239**
Radius Rocket 33 **2069**
SCSI II Booster **249**
Rocket Share **419**

FUSION
DATA SYSTEMS

AE
Applied Engineering®

PLI

Newer™
TECHNOLOGY

CARDS AND HUBS



**Asanté
10T Hub/8
(Ethernet
concentrator)**

Lets you use inexpensive unshielded twisted-pair (UTP) telephone wire instead of expensive coaxial cable for local area networks.

10Base-T Hub/8 **\$265**

Asanté EN/SC (SCSI-to-Ethernet adapter). For Macs without available slots.

EN/SC **\$339**

Asanté MacCon 3 Ethernet card. Automatically configures to media used.

MacCon 3 Card **\$216**

DaynaPORT E/II-T NuBus Card

Connects Mac II computers to thick, thin, fiber optic or 10Base-T Ethernet cable systems.

Includes an RJ-45 jack for 10Base-T wiring.
DaynaPORT E/II-T NuBus Card **\$149**

DaynaPORT E/Z. Ideal for Macs that don't have a slot for a network interface card.

DaynaPORT E/Z **\$269**

BRIDGES AND ROUTERS



CATMAN
Farallon

Shiva

FastPath 5R Router/Gateway	\$1669
NetBridge	589
EtherGate Router	1239
NetSerial	269
NetModem/E	1409
NetModem v.32 (for LocalTalk)	989
Hublet	199
LanRover/L	579
LanRover/E (4-port)	1659
TeleBridge	589

Dayna EtherPrint

Supports AppleTalk Phase 1 and Phase 2 protocols; divide your network into multiple zones.

Dayna EtherPrint **\$335**
Dayna EtherPrint Plus **439**



MODEMS

Zoom 9600 v.32/42 bis **\$259**

Supra v.32 **289**

Supra v.32 bis 14,400 **359**

SupraFax Modems include STF and Microphone software, and are backed by a 5-year warranty.

SupraFax Modem Plus **179**

SupraFax 144 PB **299**

MassMicro FM 24/96 Network **359**

MassMicro FM 24/96 Personal **165**

Global Village TelePort-Gold **459**

Global Village TelePort-Silver **399**

Global Village TelePort-Bronze **209**



STORAGE OPTIONS



PERIPHERAL LAND

44 Mb Turbo Drive	\$499
88 Mb Turbo Drive	669
128 Mb 3.5" Magneto-Optical Drive	1399
88 Mb Turbo Read/Write 44	689
CD ROM Multi-Session-Int	589
CD ROM Multi-Session-Ext	649
1 Gb MaxOptical 5.25" Erasable Drive	3549
1 Gb Infinity MiniArray Drive-Ext	2889
2 Gb Infinity MiniArray Drive-Ext	4039
Quick SCSI Accelerator	339



MASS MICROSYSTEMS

21 Mb Floptipak Drive	\$459
45 Mb DataPak Removable Cartridge Drive	549
88 Mb DataPak Removable Cartridge Drive	659
128 Mb 3.5" DataPak Magneto-Optical Drive	1559
120 Mb DiamondDrive	589
210 Mb DiamondDrive	809

1-800-364-WORLD

TOLL-FREE TECH SUPPORT:

1-800-364-MACS

Printing solutions.

Laser printers.

The right printer can do wonders for your productivity. Do you need speed? Adobe PostScript Level 2? Do you need to print a lot of pages each month?

Dpi	Engine speed	RAM	Interpreter	Microprocessor	Duty cycle	Paper trays	SCSI port	Interfaces	Resident fonts	Misc.
-----	--------------	-----	-------------	----------------	------------	-------------	-----------	------------	----------------	-------

Do you need to print complex graphics on a daily basis or large quantities of high-quality, time-sensitive documents? We can recommend the right printer for your needs.

NEC Silentwriter Model 95

\$1,399

Lease: \$38/month

- 300 dpi
- 6 pages/min.
- 2 Mb RAM (expandable to 5 Mb)

- Adobe PostScript Level 2
- Motorola 68000 processor

- 6,000 pages per month
- Built-in envelope feeder & 250-sheet tray; optional 2nd tray available in letter or legal sizes

- No SCSI port
- Appletalk RS-422, parallel, and RS-232C

- 35 Micro-fine toner and NEC's patented "Sharp Edge" technology create sharp black print quality

NEC



RealTech™



- 300 dpi
- 9 pages/min.
- 2 Mb RAM (expandable to 10 Mb)

- Adobe PostScript Level 2
- Weitek RISC processor

- 5,000 pages per month
- Optional 2nd paper tray & cassette feeder are available for \$250 (for both)

- SCSI port
- Appletalk RS-422, parallel, and RS-232C

- 35 ATM font rendering technology builds raw type characters 4 to 5 times faster, enabling the RealTech Laser to print complex documents faster than other printers in its price range.

RealTech Laser

\$1,595

Lease: \$44/month

★★★★ 1/2

Reprinted from MacUser, Sept. 1992. Copyright ©1992, Ziff Communications Co.

★★★★ 1/2

"The RealTech features not just a genuine Adobe interpreter, but also a PostScript Level 2 raster image processor (RIP), which earns it more than a few points for forward compatibility."

— PUBLISH MAGAZINE, Feb. 1992

Texas Instruments MicroLaser XL Turbo

\$2,795

Lease: \$77/month

- 300 dpi
- 16 pages/min.
- 2.5 Mb RAM (expandable to 10.5 Mb)

- Adobe PostScript Level 2
- Weitek RISC processor

- 25,000 pages per month
- Optional 2nd paper drawer

- Optional SCSI port
- Appletalk RS-422, parallel, and RS-232C

- 35



Texas Instruments MicroLaser Plus

\$1,249

Lease: \$34/month

- 300 dpi
- 9 pages/min.
- 1.5 Mb RAM (expandable to 4.5 Mb)

- Adobe PostScript Level 1
- Motorola 68000 processor

- 10,000 pages per month
- Optional 2nd paper drawer and envelope feeder

- Optional SCSI port
- Appletalk RS-422, parallel, and RS-232C

- 17 Available with 35 resident fonts (\$1349)

newgen

- 600 dpi
- 8 ppm (letter size); 4.6 ppm (tabloid size)
- 12 Mb RAM (expandable to 96 Mb)

- PostScript compatible
- Weitek XL-8220 RISC processor

- 10,000 pages per month
- Optional 2nd paper drawer

- SCSI port
- Appletalk RS-422, parallel, RS-232C

- 35

NewGen 660B

\$4,059

Lease: \$111/month

The only 11x17 printer with Adobe PostScript Level 2 for less than \$3500.



- Choice of 300 or 400 dpi
- 15 ppm (letter size); 8 ppm (tabloid size)
- 4 Mb RAM (expandable to 16 Mb)

- Adobe PostScript Level 2
- Weitek RISC processor (and ATM font rendering technology)

- 30,000 pages per month
- Two paper trays included (one tray for letter size; one tray for tabloid size.)

- SCSI port
- Three interface ports: Appletalk RS-422, IBM PC parallel, and RS-232C.

- 35

Jeanne is thrilled that she can print proofs of her company newsletter on tabloid-size paper. No more tiling!

★★★★ MACWORLD MAGAZINE September 1992

"...be forewarned: PostScript-clone printers still have a long way to go before they can rival true Adobe PostScript printers."

Quote from MacUser September 1992 issue, "Personal PostScript Printers" by Bruce Fraser.

RealTech™
RealTech
Laser 400

\$3,195

Lease: \$88/mo

QMS 860 Hammerhead™

\$4,279

Lease: \$117/mo

- 600 dpi
- 8 ppm (letter size); 4.6 ppm (tabloid size)
- 12 Mb RAM (expandable to 32)

- Adobe PostScript compatible
- Intel 80960CA RISC processor

- 10,000 pages per month
- Optional 2nd paper cassette

- SCSI port
- Optional Ethernet
- 39 fonts

Three interface ports: Appletalk RS-422, IBM PC parallel, and RS-232C.



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Customized solutions.

We can help you solve the equation of price, function, and affordability.



\$2,859
Lease: \$78/month

PowerBook Duo 230 8/80
8 Mb of RAM, 80 Mb hard drive 33 MHz 68030 microprocessor, FPU.

\$4,639
Lease: \$127/month

Macintosh IIvx Business Solution
Macintosh IIvx, 5 Mb of RAM, 230 Mb hard drive, SuperMac 21" Platinum monitor w/video card, cache card, and Key Tronic MacPro Plus extended keyboard.

\$6,399
Lease: \$175/month

Quadra 700/Trinitron Intermediate Graphics Solution
Quadra 700, 8 Mb of RAM, 520 Mb hard drive, RealTech 20" Trinitron monitor w/PaintBoard Li and Key Tronic MacPro Plus extended keyboard.

\$8,819
Lease: \$241/month

Quadra 950/Trinitron High-end Graphics Solution
Quadra 950, 8 Mb of RAM, 520 Mb hard drive, RasterOps 20" Trinitron monitor w/RasterOps PaintBoard Li and Key Tronic MacPro Plus extended keyboard.

Your choice of
CPU & HARD DRIVE
+
your choice of
MONITOR
+
your choice of
PERIPHERALS
+
OUR GREAT VALUES
+
OUR GREAT SERVICE
=
100% SATISFACTION

Talk to one of our friendly systems consultants. They'll help you figure out the right solution for your business. We can configure any combination of CPU and hard drive with the monitor and peripherals of your choice (even if you don't see it in this ad). That's why we've come to be known as your

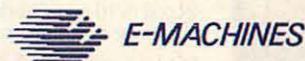
**ONE-STOP SOURCE
FOR CUSTOM
SOLUTIONS**

POWERBOOK SYSTEMS

PowerBook Duo 210 8/80.....	\$2499
PowerBook Duo 230 8/80.....	2859
PowerBook 160 8/40.....	2679
PowerBook 165c 4/80.....	3399
PowerBook 180 8/80.....	4359

POWERBOOK PORTABLE DOCKS

PowerLink Presenter (8-bit)	\$469
Designed for presentations. Connects the PB Duo to almost any type of video screen. The ideal travel dock.	
PowerLink DeskNet (8-bit)	659
Connects to Ethernet networks, color displays, external SCSI devices, etc.	



QUADRA 800 SYSTEM

Quadra 800, 8 Mb of RAM, 230 Mb hard drive, 20" Real Tech Trinitron monitor, RasterOps Paintboard Li, and MacPro Plus extended keyboard	\$6979
---	--------

CENTRIS 610 SYSTEM

Centris 610, 4 Mb of RAM, 80 Mb hard drive, Seiko Instruments 14" Color CM1445 monitor, and MacPro Plus extended keyboard	\$2415
---	--------

CENTRIS 650 SYSTEMS

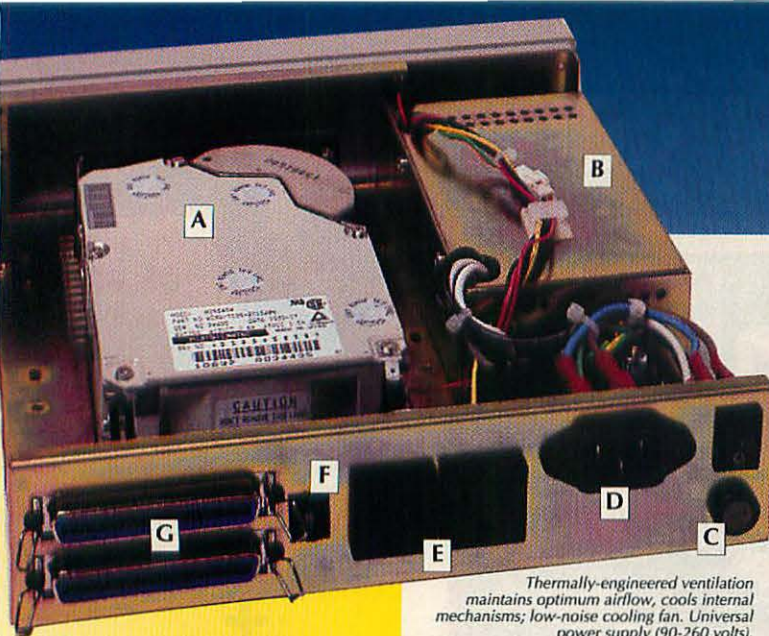
Centris 650, 8 Mb of RAM, 80 Mb hard drive, Sony 17" Color monitor, and MacPro Plus extended keyboard	\$4075
Centris 650, 8 Mb of RAM, 230 Mb hard drive, 20" Real Tech Trinitron monitor, RasterOps Paintboard Li, and MacPro Plus extended keyboard	\$5695

Toll-free ordering in the U.S. and Canada, too!
Hours: 8 am-7 pm Central Standard Time

30-DAY MONEY-BACK GUARANTEE on all hardware (except printer consumables and special-order items). Before returning merchandise, we must ask that you call our Customer Service Dept. toll-free to receive a returned merchandise authorization number (RMA). This number must be included with any products you return. No C.O.D. returns, please. Thank you for your cooperation. ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

HARDWARE THAT FITS

HARD DRIVES



Thermally-engineered ventilation maintains optimum airflow, cools internal mechanisms; low-noise cooling fan. Universal power supply (90-260 volts).

Why our drives are superior

- Fast access times
 - top-level warranties
 - optimum MTBF
 - and...
- A. We use the highest quality name-brand mechanisms available; fully tested and burned in.
- B. Shielded 40 watt power supply (65 watt for FH drives) keeps the drive free of interference, your data free of corruption.
- C. External fuse keeps fuse replacement simple.
- D. Power cable plug-in.
- E. Two switched outlets provide power to additional peripherals, allowing one-step system power-up.
- F. Easy-to-use pushbutton SCSI I.D. selector switch.
- G. Two 50-pin SCSI terminators for simple configuration.
- (Not shown) Premium double-shielded 26-inch Mac-to-SCSI cable prevents electronic interference.

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Allows all Macs to communicate with newer, high-performance hard drives at substantially faster transfer rates. Sustained transfer rate of up to 4.4 Mb per second, plus a burst transfer rate of 6 Mb per second (6/10 on a Quadra). Mirroring capabilities.

SCSI-2 Card.....\$299

Need a really big drive, with a LOT of storage capacity? These drives offer big performance.									
	Model number	Price (Internal)	Price (External)	Formatted Mac capacity	Avg. access time	Transfer rate*	MTBF** (hours)	Form factor	Warranty (years)
1.1 - 3.6 Gb									
Fujitsu 1.2	M2266	\$1395	\$1495	1079 Mb	14.5 ms	3.0 ¹	200,000	5.25 FH	5
HP 1.2	C2247	1589	1659	1000 Mb	10.5 ms	5.25 ¹	300,000	3.5 HH	5
Micropolis 1.2	2112	1729	1799	1005 Mb	10 ms	5.0 ¹	300,000	3.5 HH	5
Quantum 1.2	PRO1225	1599	1669	1200 Mb	10 ms	2.9 ¹	350,000	3.5 HH	2
Seagate 1.2	ST41200N	1369	1469	999 Mb	15 ms	3.0 ¹	150,000	5.25 FH	1
Toshiba 1.2	MK-538FB	1399	1469	1200 Mb	12.5 ms	4.0 ¹	200,000	3.5 HH	5
Maxtor 1.24	LXT-1240	1999	2069	1240 Mb	9 ms	4.5 ¹	300,000	3.5 HH	3
Conner 1.3	CP31370	\$2099	\$2199	1030 Mb	10.5 ms	6.0 ¹	250,000	3.5 HH	1
Micropolis 1.5	M152B	2299	2399	1341 Mb	14.5 ms	2.9 ¹	150,000	5.25 FH	5
Micropolis 1.6	M154B	2379	2479	1748 Mb	14 ms	4.75 ¹	150,000	5.25 FH	5
Seagate 1.6	ST41651N	1899	1999	1352 Mb	15 ms	4.0 ²	150,000	5.25 FH	1
Fujitsu 2.0	M2252	\$2449	\$2549	1752 Mb	11 ms	4.75 ²	200,000	5.25 FH	5
Micropolis 2.0	M1924	2649	2749	2100 Mb	11.5 ms	4.76 ²	250,000	5.25 FH	5
Seagate 2.1	ST42100N	1999	2099	1900 Mb	12.9 ms	3.9 ²	300,000	5.25 FH	1
Seagate 2.4	ST42400N	2879	2979	2050 Mb	11 ms	4.5 ²	300,000	5.25 FH	5
HP 2.4	C3010	2899	2999	2000 Mb	11.5 ms	5.25 ²	300,000	5.25 FH	5
Seagate 3.4	ST43400N	3999	4099	2750 Mb	11 ms	6.0 ²	300,000	5.25 FH	5
Micropolis 3.6	M1936	4299	4399	3022 Mb	12 ms	6.0 ²	250,000	5.25 FH	5

* Transfer rate (or throughput) depends on your Mac CPU and system configuration. For more information, ask your Hardware That Fits sales partner. **MTBF=Mean Time Between Failure FH=Half Height FH=Full Height

¹ SCSI-2 ² SCSI-2 Fast These drives are most efficient when used with a Macintosh Quadra 800, 950 or a RealTech SCSI-2 card.

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REALTECH TAPE BACKUP
Includes Retrospect 2.0 backup software.
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TEAC 600 Mb Drive.....\$749

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		Model number	Price (Internal)	Price (External)	Formatted Mac capacity	Avg. access time	Transfer rate*	MTBF** (hours)	Form factor	Warranty (years)
40 - 120 Mb										
Quantum 42 ELS	ELS42		\$189	\$259	40 Mb	19 ms	1.4	250,000	3.5 LP	2
Conner 85	CP-30080E		225	295	82 Mb	17 ms	1.5	150,000	3.5 LP	1
Quantum 85 ELS	ELS85		219	289	82 Mb	17 ms	1.4	250,000	3.5 LP	2
Conner 120	CP-30100		279	349	116 Mb	19 ms	1.5	150,000	3.5 LP	1
Maxtor 120	7120XT		269	339	121 Mb	15 ms	1.5	150,000	3.5 LP	2
120 - 250 Mb										
Quantum 127	ELS127		\$289	\$359	124 Mb	17 ms	1.4	250,000	3.5 LP	2
Conner 170	CP-30170E		299	369	160 Mb	9 ms	1.5	150,000	3.5 LP	1
Quantum 170 ELS	ELS170		319	389	160 Mb	17 ms	1.4	250,000	3.5 LP	2
Conner 212	CP-30200		379	449	206 Mb	12 ms	2.5 ¹	150,000	3.5 LP	1
Maxtor 213	7213		379	449	202 Mb	15 ms	2.8	150,000	3.5 LP	2
Quantum 240	LPS240		419	489	234 Mb	10 ms	1.4	250,000	3.5 LP	2
Maxtor 245	7245		429	499	245.6 Mb	15 ms	3.0	150,000	3.5 LP	2
Seagate 248	ST3283N		519	589	235 Mb	12 ms	3.0 ²	250,000	3.5 LP	1
320 - 570 Mb										
Maxtor 340	LXT-340		\$649	\$719	324 Mb	15 ms	2.1 ²	150,000	3.5 HH	2
Fujitsu 425	M2623FA		899	969	405 Mb	9 ms	2.7 ¹	200,000	3.5 HH	5
Seagate 426	ST1480N		919	989	426 Mb	14 ms	2.6 ¹	150,000	3.5 HH	1
Fujitsu 520	M2624FA		939	1009	496 Mb	9 ms	2.7 ¹	200,000	3.5 HH	5
Quantum 525 LPS	LPS525		989	1059	500 Mb	10 ms	3.2 ¹	250,000	3.5 LP	2
Seagate 525	ST1581N		1029	1099	525 Mb	14 ms	4.0 ²	150,000	3.5 HH	1
Maxtor 540	MXT-540		999	1069	546 Mb	9 ms	5.5 ²	300,000	3.5 HH	2
Conner 540	CP-3540		979	1049	515 Mb	12 ms	5.5 ²	150,000	3.5 HH	1
Micropolis 560	2105S		1129	1199	560 Mb	10 ms	5.0 ²	300,000	3.5 HH	5
660 Mb - 1.05 Gb										
Seagate 663	ST4766N		\$1119	\$1219	645 Mb	15.5 ms	1.8	150,000	5.25 FH	1
Seagate 676	ST4767N		1519	1619	645 Mb	11.9 ms	3.0 ¹	150,000	5.25 FH	1
HP 677	97556		1469	1569	620 Mb	13.5 ms	2.8 ¹	150,000	5.25 FH	5
Quantum 700	PRO700		1249	1319	700 Mb	10 ms	2.9 ¹	350,000	3.5 HH	2
Toshiba 877	MK-438FB		1099	1169	830 Mb	12.5 ms	3.0 ²	200,000	3.5 HH	2
Quantum 1050	PRO1050		1419	1489	1000 Mb	10 ms	2.9 ¹	350,000	3.5 HH	2
HP 1050	97558		2099	2169	987 Mb	13.5 ms	2.8 ¹	150,000	5.25 FH	5
Seagate 1050	ST11200N		1649	1719	1000 Mb	10.5 ms	5.1 ¹	200,000	3.5 HH	1

* Transfer rate (or throughput) depends on your Mac CPU and system configuration. For more information, ask your Hardware That Fits sales partner. **MTBF=Mean Time Between Failure LP=Low Profile HH=Half Height FH=Full Height

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1225	1499	1569
ELS Low Profile Drives <small>MW EDITOR'S CHOICE</small>		
42	\$159	\$219
85	199	269
127	299	369
170	339	399

Fujitsu <small>MW EDITOR'S CHOICE</small>		
MB	INTL	EXTL
520	\$949	\$1049
1.2G 5.25	1399	1499
1.2G 3.5	1799	1899
2.0G	2299	2399

Micropolis		
MB	INTL	EXTL
560	\$1299	\$1369
1.2G	1699	1799
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Includes Micropolis' 5-Year Warranty		

Toshiba		
1.2G	\$1399	\$1499
213	699	829†
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Maxtor		
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213	349	409
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AC only	\$79
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New! The SyQuest 5110c reads and writes 44 and 88MB cartridges!



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APSModem, 2400 baud data, 9600 baud fax send, 4800 baud fax receive, installation instructions—compatible with PowerBook 100 through i80

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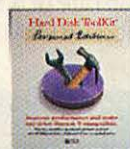
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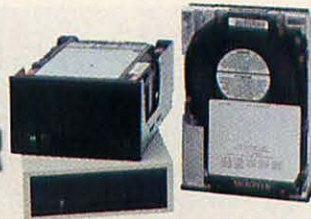
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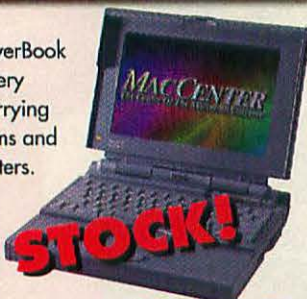
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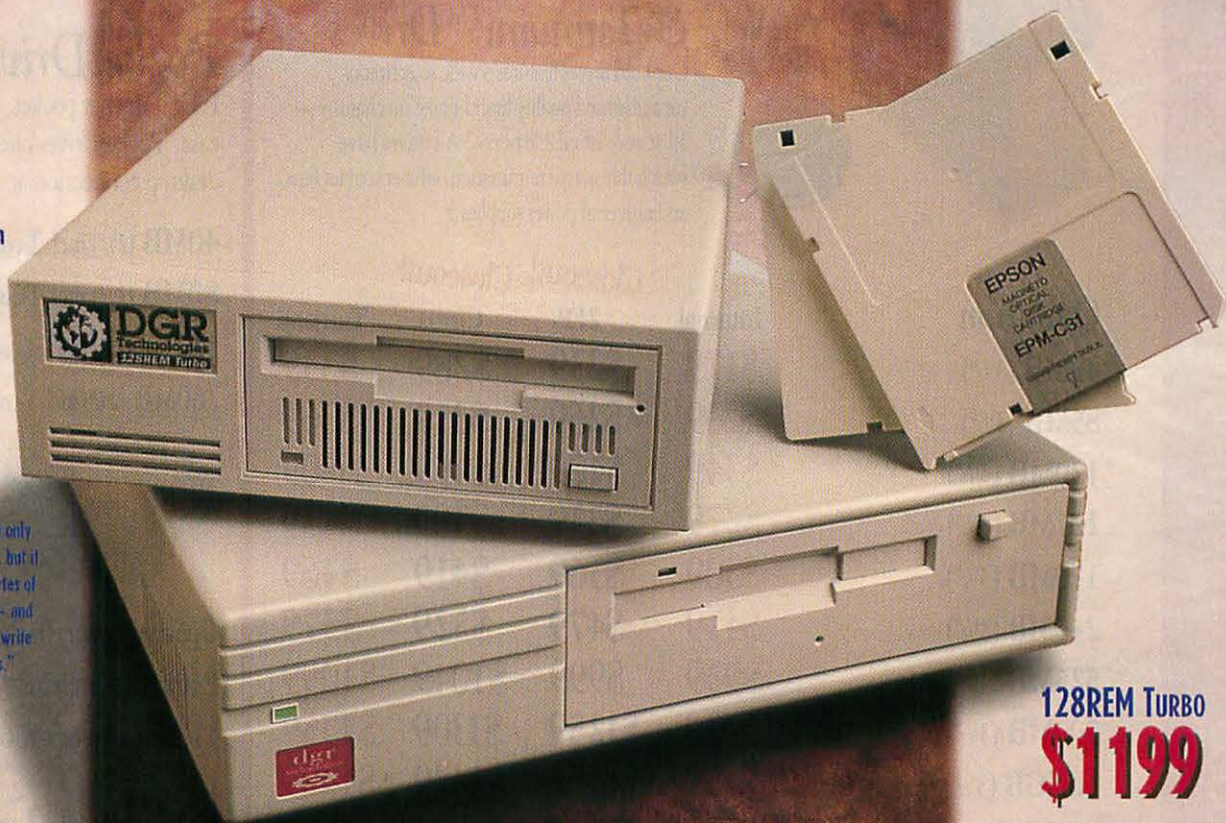
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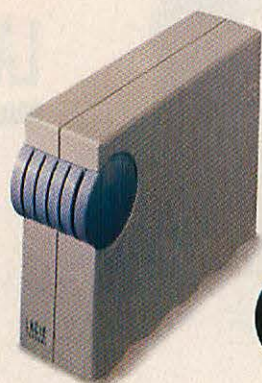
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88C
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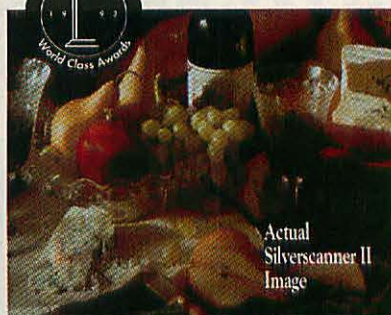
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External SyQuest 88mb C** (*One Cartridge Inc.)	\$589
Internal 44mb SyQuest (for Quadra 900&950)	\$349
Internal 88mb SyQuest (for Quadra 900&950)	\$469
Internal 88mb C SyQuest (for Quadra 900&950)	\$559
External SyQuest Dual 44mb (*One Cartridge Inc.)	\$725
External SyQuest Dual 88mb (*One Cartridge Inc.)	\$895
External SyQuest Dual 44/88mb (*One 44 & One 88 Cartridge)	\$895
External SyQuest Dual 88C mb (*One Cartridge Inc.)	\$1075
External SyQuest Dual 44/88C mb (*One 44 & One 88 Cartridge)	\$999
SyQuest 44mb Cartridge/10 Pack	\$63/\$62
SyQuest 88mb Cartridge/5 Pack	\$97/\$480
All SyQuest Drives come with FWB™ HDT Formatting Software. SyQuest carries a TWO year Warranty on Drives and ONE year on Cartridges. *READS AND WRITES 44 AND 88 CARTRIDGES. Does not format 44 cartridges.	

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ELS 127mb	17ms	3.5"TH	\$279	\$339
ELS 170mb	17ms	3.5"TH	\$309	\$369
LPS 105mb	10ms	3.5"TH	\$249	\$309
LPS 240mb	10ms	3.5"TH	\$399	\$459
LPS 525mb	10ms	3.5"TH	\$899	\$959
Pro 425mb	9ms	3.5"TH	\$859	\$919
Pro 700mb	10ms	3.5"TH	\$1179	\$1239
Pro 1.0gb	10ms	3.5"HH	\$1349	\$1409
Pro 1.2gb	10ms	3.5"HH	\$1579	\$1639
*GO-80mb	16ms	2.5"PB	\$299	\$399
*GO-120mb	16ms	2.5"PB	\$399	\$499
*GO-160mb	16ms	2.5"PB	\$499	\$599

TWO year Warranty. *ONE year Warranty on GO drives. FWB™ HDT Formatting Software Included.

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212mb	12ms	3.5"TH	\$415	\$475
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SilentWriter 95F Printer	\$1385
SilentWriter 95FX Printer	\$1855
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213mb NEW!	12ms	2.5"PB	\$669	\$769
CD-ROM				
600mb NEW!	200ms	3.5"HH	\$585	\$635

Toshiba carries a THREE year Warranty on drives. ONE year Warranty on CD Rom. FWB HDT Formatting Software Included.

FUJITSU

Unformatted Capacity	Speed	Size	Internal	External
425mb	9ms	3.5"HH	\$849	\$909
520mb	9ms	3.5"HH	\$899	\$959
1.2gb NEW!	9ms	3.5"HH	\$1699	\$1759
1.2gb	15ms	5.25"FH	\$1399	\$1499
2.0gb	15ms	5.25"FH	\$2299	\$2399
2.4gb	12ms	5.25"FH	\$2499	\$2599

FIVE year Warranty. FWB™ HDT Formatting Software Included.

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213mb	15ms	3.5"TH	\$375	\$435
340mb	15ms	3.5"HH	\$625	\$685
535 mb	12ms	3.5"HH	\$955	\$1015
540 mb NEW!	9ms	3.5"HH	\$1055	\$1115
1.2gb NEW!	9ms	3.5"HH	\$1655	\$1715
1.2gb	13ms	5.25"FH	\$1395	\$1495
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4mb/6mb/8mb/10mb	\$225/\$295/\$395/\$445
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4mb/8mb	\$299/\$499
PC 1x9/4x9	\$39/\$139
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Model	Speed	Size	External
128mb	45ms	3.5"HH	\$989
128mb cartridges (Tosoh)			\$29

IIICOH

Model	Speed	Size	External
650mb	28ms	5.25"FH	\$2375
128mb	45ms	3.5"HH	\$1075
128mb/650mb Cartridge			\$29/95

Maxtor®

Model	Speed	Size	External
Tahiti II	35ms	1.0gb	\$3195
1.0gb Optical Glass Cartridge			\$225

All MO drives come with FWB HDT software, ONE MO cartridge and have a ONE year Warranty.

TAPE BACK-UP DRIVES

ARDAT

Model	External
2.0gb	\$1185
4.0gb - 8.0gb HC	\$1385
4.0gb - 8.0gb HC Turbo	\$1485
90m / 60m Tape	\$19/\$16

TEAC

Model	External
600mb Tape Backup Drive	\$685
150mb Tape Backup Drive	\$485
600mb / 150mb Tape Cassette	\$25/\$20

All tape backup drives come bundled with FREE Retrospect V.1.3, one tape and have a ONE year Warranty.



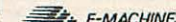
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425MB M2623FA	3.5 HH	9	\$839 \$899
520MB M2624FA	3.5 HH	9	\$945 \$1005
1.1GB M2694SA	3.5 HH	8.5	\$1695 \$1760
1.2GB M2266SA	5.25 FH	14.5	\$1395 \$1495
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• Five year warranty

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127MB ELS127	3.5 1"	17	\$289 \$349
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525MB LPS525	3.5 1"	10	\$939 \$999
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• ELS, LPS, PRO drives have two year warranty
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• Drives ship with one cartridge
• Drives have two year warranty

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1.2GB PO-12S	5.25 FH	13	\$1425 \$1525
1.7GB P1-17S	5.25 FH	13	\$1725 \$1825

• 3.5" drives have one year warranty
• 5.25" drives have two year warranty

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1.6GB ST41600N	5.25 FH	11.5	\$1999 \$2099
2.4GB ST42400N	5.25 FH	11	\$2879 \$2979
3.4GB ST43400N	5.25 FH	11	\$3929 \$4029

• Drives have one year warranty

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2.0GB 1924	5.25 FH	10	\$2849 \$2949

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• SyQuest cartridges have one year warranty

EPSON

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• MO drives carry
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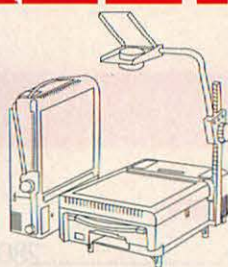
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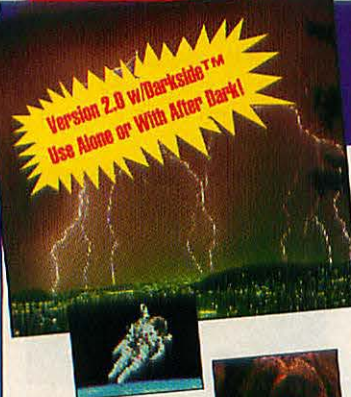
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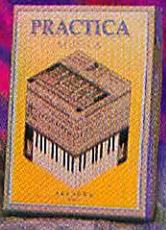
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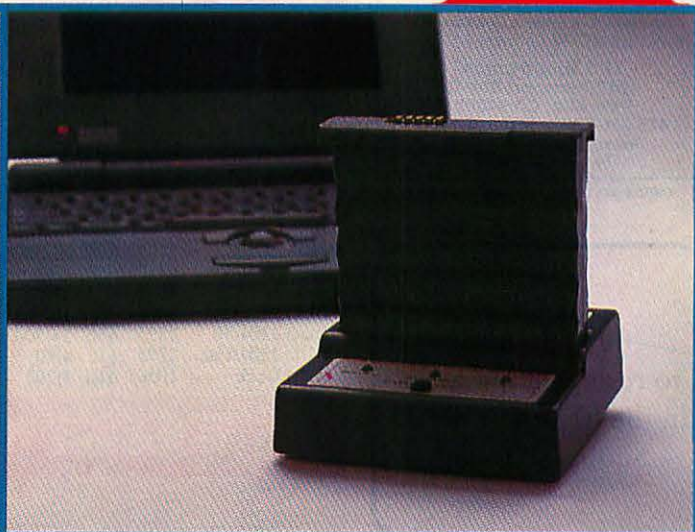


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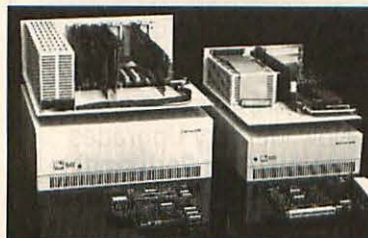
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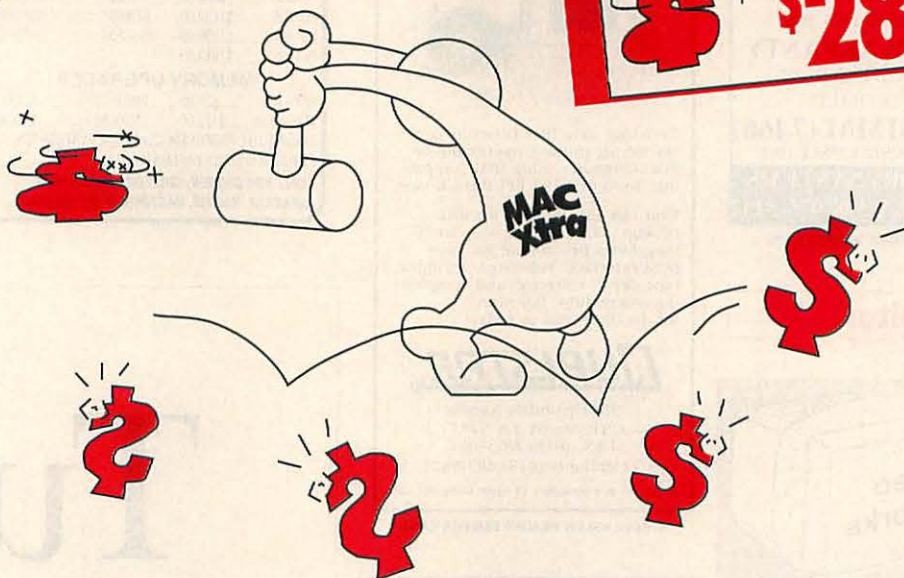
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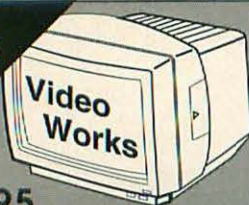
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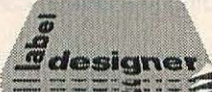
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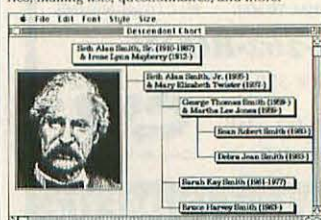
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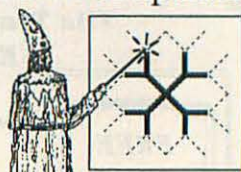
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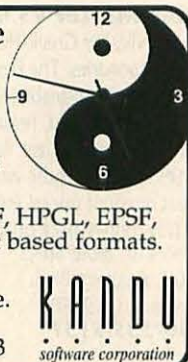
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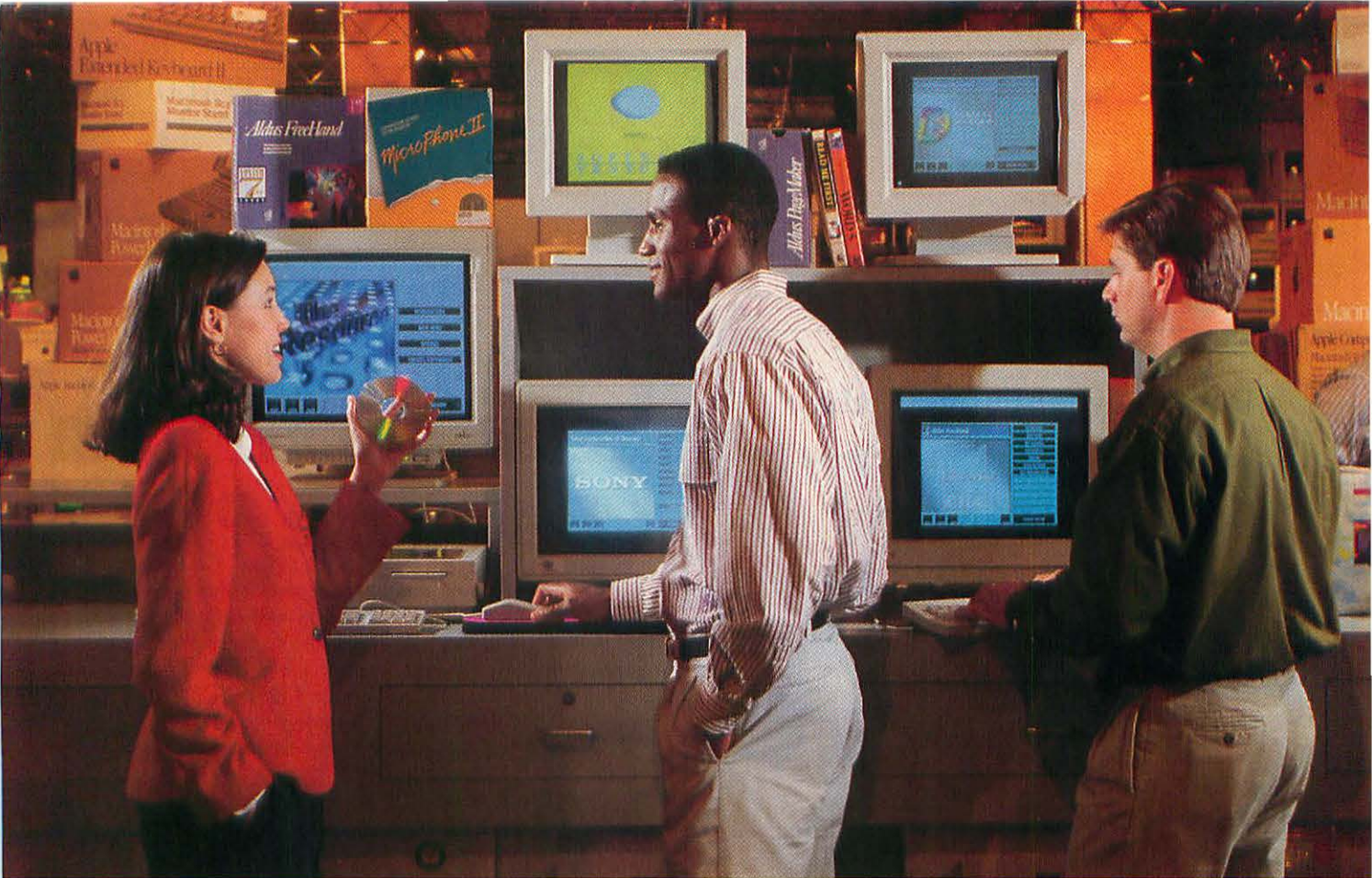
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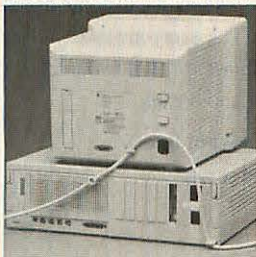
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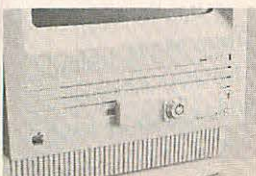
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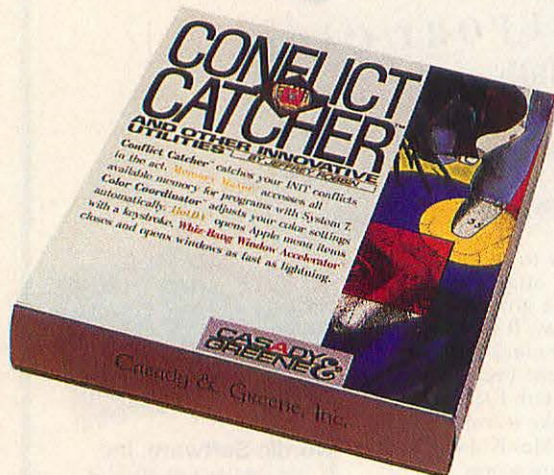
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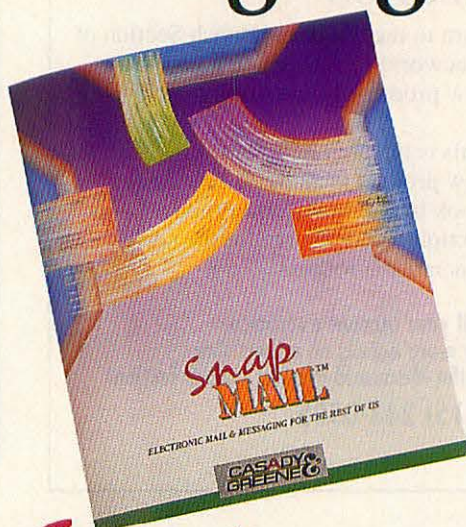
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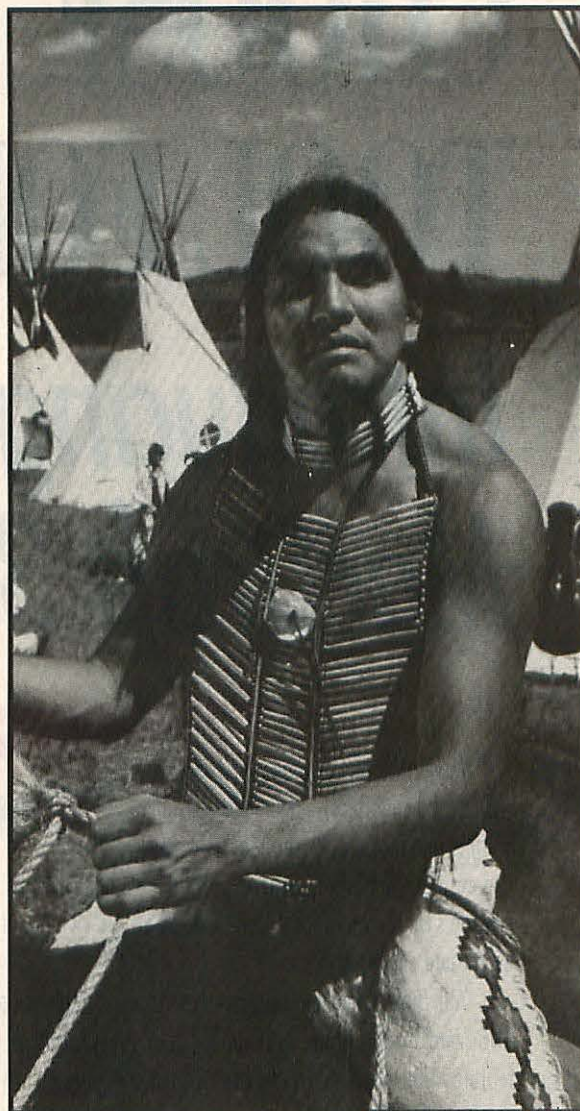


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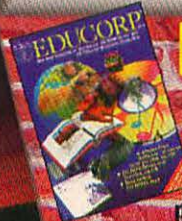
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48	10	9	WordPerfect for the Macintosh <i>WordPerfect Corporation</i>
11	9	10	1-2-3 for the Macintosh <i>Lotus Development</i>
36	12	11	QuarkXPress <i>Quark</i>
83	14	12	Aldus PageMaker <i>Aldus Corporation</i>
26	13	13	MacProject <i>Claris Corporation</i>
30	—	14	Adobe Illustrator <i>Adobe Systems</i>
71	—	15	MacWrite II <i>Claris Corporation</i>

Education Software

62	3	1	Reader Rabbit <i>The Learning Company</i>
19	1	2	Math Rabbit <i>The Learning Company</i>
3	4	3	The Oregon Trail <i>MECC</i>
46	—	4	Where in the World Is Carmen Sandiego? <i>Broderbund Software</i>
27	—	5	Where in Time Is Carmen Sandiego? <i>Broderbund Software</i>

Months on chart
▼ Last month
▼ This month

Entertainment Software

61	1	1	Microsoft Flight Simulator <i>Microsoft Corporation</i>
21	5	2	Beyond Dark Castle <i>Aldus Consumer Division</i>
6	—	3	Space Quest III <i>Sierra On-Line</i>
35	3	4	Tetris <i>Spectrum HoloByte</i>
34	4	5	Falcon <i>Spectrum HoloByte</i>

Network/Data Communications

42	2	1	PhoneNet <i>Farallon Computing</i>
11	1	2	AppleTalk Remote Access <i>Apple Computer</i>
19	4	3	Netware for Macintosh <i>Novell</i>
65	3	4	AppleShare <i>Apple Computer</i>
2	—	5	Etherlink NuBus <i>3Com Corporation</i>

Add-In Boards

25	1	1	Macintosh IIsi NuBus Adapter Card <i>Apple Computer</i>
9	3	2	Macintosh II FDHD Upgrade <i>Apple Computer</i>
29	2	3	Macintosh Display Card 8•24 <i>Apple Computer</i>
21	4	4	Radius TPD Interface <i>Radius</i>
1	—	5	Precision Color Xp <i>Radius</i>

Months on chart
▼ Last month
▼ This month

Utility Software

35	2	1	SAM <i>Symantec Corporation</i>
24	1	2	After Dark <i>Berkeley Systems</i>
30	3	3	Norton Utilities for Macintosh <i>Symantec Corporation</i>
14	4	4	More After Dark <i>Berkeley Systems</i>
1	—	5	At Ease <i>Apple Computer</i>

The AmCoEx Index of Used Mac Prices

Machine/RAM/ Hard Drive	Average Sale Price	Monthly Change
Mac SE/2MB/20MB	\$675	\$0
Mac Portable/1MB/40MB	\$700	+\$50
PowerBook 100/4MB/40MB	\$950	+\$50
PowerBook 140/4MB/40MB	\$1450	+\$50
Mac Classic/2MB/40MB	\$700	+\$25
Mac SE/30/2MB/40MB	\$1250	-\$200
Mac LC/2MB/40MB	\$700	-\$150
Mac II/4MB/40MB	\$1100	-\$200
Mac IIsi/3MB/40MB	\$1000	-\$225
Mac IICx/4MB/80MB	\$1350	-\$50
Mac IICi/4MB/80MB	\$1800	-\$150
Mac IIfx/4MB/80MB	\$2500	-\$100
Apple 12-inch B&W display/board	\$125	\$0
Apple 13-inch RGB display/board	\$375	-\$25
LaserWriter Plus	\$725	-\$100
LaserWriter IINT	\$1050	-\$125

Index provided by the American Computer Exchange of Atlanta, Georgia (800/786-0717). It reflects sales during week of February 19. Configurations include keyboard and exclude monitor and display board for noncompact models.

Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during January 1993.

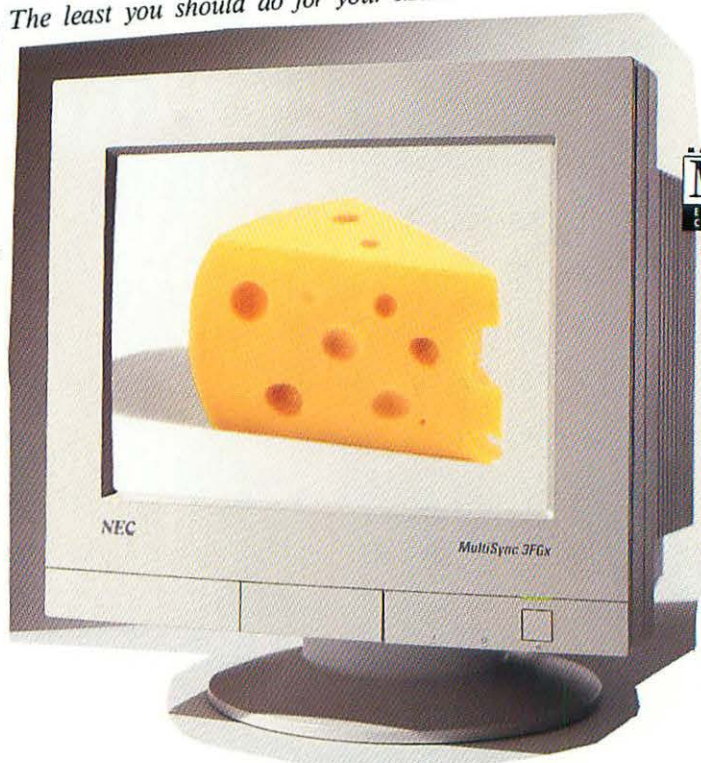


Announcing a better mousetrap.

NEC

The least you should do for your Mac[®]

The NEC MultiSync[®] 3FGx[™] monitor



In 1992, the only monitor to snag the coveted five-mice rating was an NEC monitor: the remarkable MultiSync 4FG. After running it and 13 others through the most rigorous technical evaluation they'd ever used for testing monitors, *MacUser* magazine concluded, "If you're looking for the sharpest display, the NEC MultiSync 4FG should be your top choice."

What more can we say? Glad you asked. First, there's our AccuColor[™] Control System, which prompted *MacUser* to make special mention of the "easy color adjustments." AccuColor lets you adjust on-screen colors, so if you're looking for mouse-tail pink, that's what you'll get.

If, however, color control is not a priority for you, you'll be very happy with NEC's MultiSync 3FGx monitor, which shares almost all of the 4FG's award-winning features. Both monitors produce sharp, bright images, crisp graphics and vibrant colors. An Invar shadow mask provides increased brightness without loss of focus. And our high-contrast polished screen improves clarity.

Another big idea—the display area. The large 15" screen* coupled with FullScan[™] capability for edge-to-edge images gives you a considerably larger display area than typical 13" or 14" RGB monitors.

How do you make an NEC MultiSync monitor work with your Mac? Just plug it in, using

NEC's free FG/Mac cable adapter. It works with the Mac's on-board video, so you won't need an add-in video board.[†]

Both monitors are compatible with the Mac[®] II family, Quadra[™] series, LC's, PowerBooks[™] and PC systems. So you can use just one monitor for both types of platforms. *MacUser* noted the "powerful and versatile controls make switching from a Mac to a PC a snap."

And to make these monitors as user-friendly as possible, we've included ergonomic features such as a tilt/swivel base and up-front user controls. Plus, our Reduced Magnetic Field[™] technology meets the strict Swedish MPR II guidelines for magnetic field emissions.

There are lots of reasons for considering an NEC MultiSync monitor for your Mac—the sharp, bright images, the vibrant colors, the large display area, the flexibility, the compatibility—to name five. And the 🖱️🖱️🖱️🖱️ to name five more.

For more information on our award-winning monitors, call 1-800-NEC-INFO (in Canada: 1-800-343-4418). Or for information via fax, call NEC FastFacts[™] at 1-800-366-0476, request #62234.

[†]For Macintosh 640x480 resolution, just attach NEC's FG/Mac cable adapter and plug into: Macintosh (II), Ix, LC, LCI, Ix, Ix, Quadra[™] 700, Quadra 900, Quadra 950, Performa[™] 400, Performa 600, PowerBook[™] 150, PowerBook 180, and the PowerBook 210 and PowerBook 230 with either the DuoDock[™] or MiniDock[™]. Or with an add-in video card: Macintosh II, Ix, Ix, Ix, PowerBook 140, PowerBook 145, and PowerBook 170. Get the FG/Mac adapter free by calling NEC at (312) 622-7427 8:30AM-5PM CST.

*15" CRT yields 13.8" active display area. All quotes reprinted from *MacUser* magazine, August 1992. © 1992, ZIF Communications Company. MacUser and 5-mice logo are registered trademarks of ZIF Communications Company. MultiSync is a registered trademark and AccuColor, FastFacts, F.G. FullScan, Reduced Magnetic Field and MultiScan are trademarks of NEC Technologies, Inc. Silentwriter is a registered trademark of NEC Corporation. All other trademarks are the property of their respective owners. © 1992 NEC Technologies, Inc.

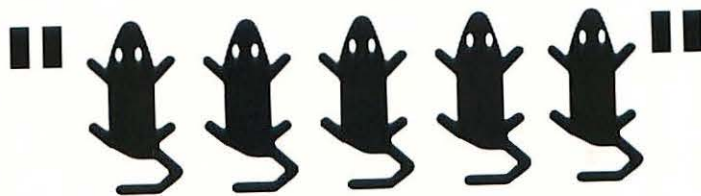
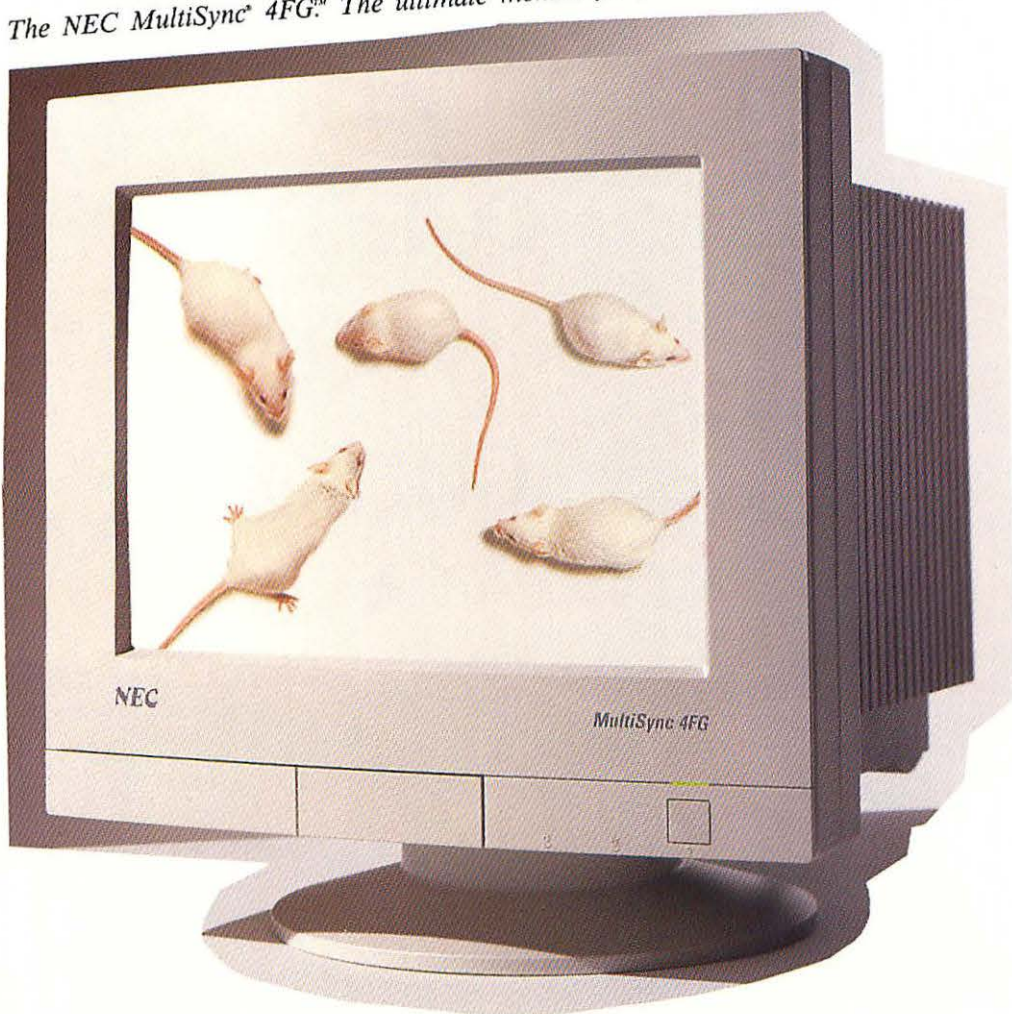
Because  is the way you want to go. **NEC**

Circle 16 on reader service card

The NEC MultiSync® 4FG™ The ultimate monitor for your Macintosh®



At NEC, we've developed hundreds of computer products expressly for Mac systems: from our highly-acclaimed MultiSync monitors, MultiSpin™ CD-ROM readers and Silentwriter® laser printers, to our Professional Graphics Series, which includes our new 27" MultiSync 3PG data monitor and MultiSync 6PG and 9PG Projection Monitors for images as large as 25 feet.



*—MacUser Magazine
Aug. '92*

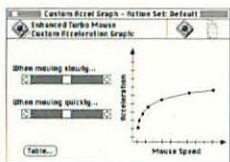
Cursor control. After all, that's what a pointing device really is all about. And now, with the introduction of Turbo Mouse® 4.0, cursor control takes on a whole new meaning.

Macworld said, "Turbo Mouse 4.0 represents a real breakthrough in trackball software design. If you're shopping for a trackball, Turbo Mouse deserves first consideration."

Why a breakthrough? Why is Turbo Mouse rated number 1?

The answer lies in a new and total integration of hardware and software. Take a look:

Custom Acceleration lets you change cursor speed according to the way you move the trackball. The faster the movement, the faster the acceleration. You can even have negative acceleration for detailed and precise work.



Want a really slow cursor? Activate the Slow Cursor command and you can temporarily move your cursor one pixel at a time.

Want a really fast cursor? Our new Brilliant Cursor™ technology will jump your cursor from one programmed HotSpot

KENSINGTON

Don't just control your cursor.



to another. A real plus for large screen and multiple monitor setups.

And Turbo Mouse 4.0 features Enhanced Mouse Buttons that let you execute one of seven useful commands. You can even have the same button perform different commands in different applications.

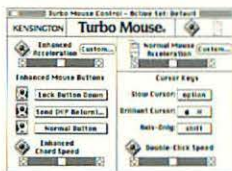
Combine all this with onscreen help, System 7 compatibility, two ADB ports for chaining — not

to mention a large comfortable ball with an ultra-responsive feel — and

you'll understand why Turbo Mouse has won more awards than any other Macintosh input device in history.

For more information, call 800-535-4242.

For information by fax, press 82 and request document 320. Outside the US and Canada, call 415-572-2700.



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